NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 8, Number 17 | An International Data Group Publication | April 29, 1991

System One outsources nets to EDS

By Barton Crockett and Wayne Eckerson
Network World Staff

PLANO, Texas — System One Corp. and Electronic Data Systems Corp. (EDS) last week announced one of the largest outsourcing deals ever — a 10-year, $2.1 billion contract in which nearly 2,000 System One employees will move to EDS' payroll.

Under the deal, EDS will take over management of System One's three data centers and its global network. It will also pay $35 million for a System One sister company, Continental Airlines Services Division, which supplies ticketing, baggage tracking and other network services to about 175 airlines.

EDS says it will use current System One employees to run the global network, which supports System One parent Continental Airlines, Inc. and about 7,800 travel agencies. But plans are being formulated to merge the System One and EDS networks, and insiders say the debate over which network should win out has turned into a political debacle.

The resolution of this issue could affect the standing of Sys-

(continued on page 5)

PHOTO ©1991 WENDY BARROWS

IBM's William Grabe and David Schleicher show off a new AS/400.

Firm improves employee efficiency with local nets

Abandons mainframe, completes migration in 1 year.

By Timothy O'Brien
West Coast Bureau Chief

FORT LAUDERDALE, Fla. — BellSouth Mobility, Inc. just completed a rapid one-year migration in which it moved all customer service operations except billing from an IBM mainframe to a multisite LAN internetwork.

Operators in the southern Florida region of the mobile phone service provider now have more on-line information at their fingertips and can handle more calls, productivity gains that have spurred the company to accelerate the pace of local-area network deployment.

In a meeting scheduled for early May, the benefits of the networks will be evaluated by all regions of BellSouth Mobility in an attempt to set a strategy for installing LANs companywide.

"Our mainframe system was archaic," said John Silling, manager of data systems at the company. "We had to do something to see some improvements."

The LAN-based system replaced dumb terminals that company operators used to answer customer inquiries by accessing two IBM 3090 mainframes in Georgia. Because the resources

(continued on page 61)

IBM solidifies role of AS/400 as net server

Vendor rolls out new APIs, enhances NetWare ties, serves up support for SQL and IBM DBMS spec.

By Paul Desmond
Senior Editor

NEW YORK — IBM last week rolled out new models of its Application System/400 minicomputer and several communications enhancements, many of which are intended to beef up the AS/400's role as a LAN server.

Among the enhancements are new application program interfaces (API), enhanced support for Novell, Inc.'s NetWare and improved support for SQL and IBM's Distributed Relational Database Architecture (DRDA).

IBM also announced a new version of the OS/400 operating system that improves the AS/400's ability to interoperate with other machines in a multivendor network by giving it support for Open Systems Interconnection file-transfer and electronic mail protocols (see "AS/400 ups OSI support," page 62).

William Grabe, vice-president and general manager of IBM's U.S. Marketing and Services unit, said the announcement will nearly double the number of AS/400 models available and provide 30% to 60% better price/performance than existing machines.

Newer high-end systems, for instance, offer 2.8 times the performance of previous high-end models yet cost 30% less, Grabe said.

And the new OS/400 Version 2 operating system will use that

(continued on page 62)

The changing face of RBHC ISDN deployment plans

Number of ISDN central offices scheduled for 1994

RBHC	In Feb. 1990 FCC filing	Revised
Ameritech	153	597
Bell Atlantic Corp.	1,164	700
BellSouth Corp.	345	226
Nynex Corp.*	53	80
Pacific Telesis Group	120	135 to 175
Southwestern Bell Corp.	96	167
US West, Inc.	121	230

*Figures for year-end 1993.

SOURCE: FCC FILINGS AND BELLCORE DOCUMENTS
GRAPHIC BY SUSAN J. CHAMPENY

RBHCs revise schemes for ISDN rollout

By Bob Wallace
Senior Editor

LIVINGSTON, N.J. — Bell Communications Research last week detailed how regional Bell holding companies have changed their ISDN deployment plans due to the release of the Bellcore National ISDN-1 specification.

The first RBHC plans announced since the release of the specification show carriers supporting ISDN on far more switches by year-end 1994 than was projected as recently as last year.

In most instances, the deployment plans are markedly more ambitious than those filed with the Federal Communications Commission in early 1990 (see graphic, this page).

ISDN-1 is a set of Bellcore

(continued on page 62)

NETLINE

LONG-DISTANCE CARRIERS may begin monitoring users' traffic patterns in an effort to curb toll fraud. Page 2.

INFOTRON, GANDALF to combine forces in order to offer both LAN and WAN products. Page 2.

MOTOROLA TEST FINDS that PCN and microwave can't share the same bandwidth. Page 4.

AMERICAN CYANAMID signs multimillion-dollar international network deal with France Telecom. Page 5.

DEC FORGES LINKS to other network environments with DECnet/OSI Phase V. Page 45.

AUTODIALING COMPUTER lands Emory University's 10,000-line phone network in the Swamp. Page 63.

NEWSPAPER

FEATURE

Weighing factors in the twisted-pair/fiber choice

By Edwin Mier
Special to Network World

Consider the eternal wiring question: Which physical medium is most economical to install today to serve both current and future data needs?

That question is always of interest because the price of installing wire can be a major component of a network's total cost.

This article examines whether users should install unshielded twisted pair today to support future speeds ranging from 16M to 100M bit/sec.

What may affect that decision are prospects that future networks may operate at speeds far above 100M bit/sec. At the June International Conference on Communications in Denver, an IBM representative is scheduled to present a paper on the performance of Fiber Distributed Data Networks at 1G bit/sec.

If users have inklings that they may require such speeds in the foreseeable future, they should probably install fiber. While there are questions about whether unshielded copper will

(continued on page 29)

Oracle unveils data base for Novell NetWare 386 LANs

Software runs as an NLM under NetWare, offers performance gains over versions for Unix, OS/2.

By Timothy O'Brien
West Coast Bureau Chief

REDWOOD SHORES, Calif. — Oracle Corp. last week announced the availability of Oracle Server for NetWare 386, the long-awaited data base server product for Novell, Inc.'s popular NetWare 386 local-area network operating system.

In a joint announcement with Novell, Oracle said it considers Oracle Server for NetWare 386 to be its most significant server product to date. As one of the major SQL data base vendors, Oracle wants to take advantage of Novell's huge installed base of LANs.

Oracle Server for NetWare 386 will let users run the Oracle data base software on existing NetWare 386 servers instead of having to implement the data base on a Unix or OS/2 platform.

Oracle Server for NetWare 386 is one of the first SQL data base products available as a NetWare Loadable Module (NLM), meaning the data base takes full advantage of the native mode of NetWare 386. As an NLM, the data base will work in conjunction with the NetWare file and print services, offering significant performance increases over the OS/2 and Unix versions.

Oracle Server for NetWare 386 has four NLMs: Oracle Relational Database Manager System

(continued on page 65)

Long-haul carriers may offer toll-fraud monitoring

Services would help shield customers from hackers.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Long-distance carriers are considering offering services that would shield customers from toll fraud by monitoring network activity for suspicious traffic patterns and tipping off users before huge costs could be run up, *Network World* has learned.

Hackers are defrauding corporations by dialing into their private branch exchanges and using stolen authorization codes to dial out of the switches to remote destinations, sticking the switch owners with charges ranging from several thousand to, in one case, a million dollars.

Users have been loathe to report toll fraud because they are embarrassed about the security breaches or because they have entered into private settlements with carriers that cannot be disclosed. But earlier this year, Pacific Mutual Life Insurance Co., exasperated by $200,000 in fraudulent charges run up during one weekend and lack of progress in settling the issue with AT&T, turned to the Federal Communications Commission for help.

The insurance company asked the FCC to open a proceeding in order to establish guidelines that

(continued on page 61)

Infotron, Gandalf to merge, cover LAN, WAN market

By Bob Brown
Senior Editor

Infotron Systems Corp. and Gandalf Technologies, Inc. last week announced plans to merge and form a company capable of providing users with one-stop shopping for both local- and wide-area network products.

The announcement, which calls for Infotron to merge with an as yet undetermined Gandalf subsidiary, comes on the heels of an Infotron public statement last month that it was seeking business partners. The announcement also coincided with Infotron's report last week that it lost $33.3 million in 1990 and that revenue fell 11% from 1989.

Industry observers applauded the planned merger, which is based on a stock swap, saying the companies have complementary product lines and little product overlap.

Combined strength

The strength of Infotron, based in Cherry Hill, N.J., lies in T-1 and T-3 multiplexers. The company disbanded its LAN Systems Division last summer to focus on its core products. Gandalf, based in Ottawa, is primarily a vendor of data switches and modems but has refocused on wiring

(continued on page 64)

Briefs

Racal-Milgo to unwrap network tool. Racal-Milgo next week is scheduled to unveil its Multifunction Communications System, a standalone unit that will support a variety of local-area networks and terminal-to-remote host traffic. The unit, which will include both a packet and circuit switch, can be used as a router to access switched, leased-line, Integrated Services Digital Network, Switched Multimegabit Data Service and frame relay services. Users can attach Ethernet, token-ring or Fiber Distributed Data Interface networks, as well as synchronous and asynchronous terminals to the local side of the system.

Vendors form LAN Manager council. Twenty-four companies last week united to form the Open LAN Manager Council, designed to ensure interoperability among vendors' implementations of Microsoft Corp.'s LAN Manager local-area network operating system. The participants included such industry giants as AT&T, Digital Equipment Corp. and IBM. According to Microsoft, the council was formed in response to user requests that more emphasis be put on interoperability among different environments.

WorldCom to unveil custom service. International carrier World Communications, Inc. (WorldCom) this week plans to introduce its Customized Bandwidth Service, which will enable users to acquire fractional T-1 bandwidth between the U.S. and Puerto Rico on an hourly basis. WorldCom will charge $170 per hour for 112K bit/sec of capacity and $95 per hour for 56K bit/sec of bandwidth between New York and San Juan.

NCR terms AT&T offer 'fair.' In a letter last week to AT&T Chairman Robert Allen, NCR Corp. Chairman Charles Exley said AT&T's $110-per-share, or $7.48 billion, offer to buy NCR is fair. But he tempered his enthusiasm for the offer by stressing that NCR shareholders must first be assured that they will receive $110 per share even if AT&T's stock price falls in ensuing weeks. AT&T did not respond to Exley's comment by press time.

Unisys, NET detail fiscal woes. Unisys Corp. last week announced a net loss of $98.2 million for its first quarter, ended March 31, as compared to a loss of $3.2 million in the corresponding quarter a year ago. Revenue for the quarter was $2.06 billion, down from $2.31 billion in the first quarter of last year. Unisys blamed the loss on the weak economy. The company said it will continue its year-old cost-cutting program, in part by narrowing and focusing its product line and selling non-strategic assets. Officials would not comment on whether the company will sell Timeplex, Inc., the T-1 multiplexer maker that generated $263 million of Unisys' $10.1 billion in revenue for 1990.

Timeplex competitor Network Equipment Technologies, Inc. (NET) last week reported a net loss of $46.1 million for fiscal 1991, compared with a net income of $13.5 million in the prior year. NET's revenue for 1991 was $135 million, down from $180.8 million a year ago.

I(SDN) love New York. Both New York Telephone Co. and TC Systems, Inc., a subsidiary of bypass carrier Teleport Communications Group, last week began offering Integrated Services Digital Network Basic Rate Interface services in New York City. Although New York Telephone has been providing ISDN on a special contract basis to several users, its ISDN tariffs were approved late last month and took effect on Friday.

TC Systems signed Citibank, N.A., a subsidiary of Citicorp, as the first customer of its Centrex-based ISDN offering. TC Systems will give pricing details and make the ISDN offering available this summer.

Vendors to unify X.500 directories. Thirteen electronic messaging vendors in the North American Directory Forum (NADF) last week said the vendor group has drafted documents outlining a standard naming architecture for X.500 directories and methods for interconnecting the X.500 directories of different service providers.

The group also opened talks with users in an attempt to make information in private electronic mail network directories accessible to public E-mail service users. Formed last year, NADF is trying to define a common X.500 directory service that will enable U.S. or Canadian net users to locate the E-mail addresses of other users, regardless of which public net they use.

CONTENTS

Industry Update
Firms assail FCC's int'l spectrum stance. 7
Racal Data launches major marketing reorganization. 7

Telecommunications
Greene reexamines ban on info services. 9
Tandem API allows NonStops to link to PBXs. 9

Data Communications
Hayes terminal adapter ties systems to BRI lines. 15
OSF progresses in search for its DME technology. 15

Local Networking
Connectivity cause of data mgmt. woes. 17

Management Strategies
Networking key to surviving rail strike. 21

International
U.S. users pan global videoconferencing. 23
Oracle scours int'l service bill and unearths surprise. 23

Products & Services
Wang combines host data and LAN images. 25

Opinions
Compaq needs a new SystemPro support strategy. 26
FCC should scrutinize AT&T's newest Tariff 12 revision. 26
Should fiber usage in the local loop be a priority? 27

Action Center 32
Networking Marketplace 36
Networking Careers 40
Resource Directory 41

NW Bulletin Board. Contact us electronically. Our BBS lets you submit letters to the editor, pass on tips, leave change of address requests, interact with other readers, download free software and hunt for jobs.

Use your IBM, Apple or other microcomputer to reach the BBS at 300 to 2,400 bit/sec (8N1) by dialing (508) 620-1160 or at speeds up to 9.6K bit/sec by dialing (508) 620-1178. You can speak to us directly by calling (800) 622-1108.

Article reprints (minimum 500 copies) can be obtained from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172; (508) 875-6400.

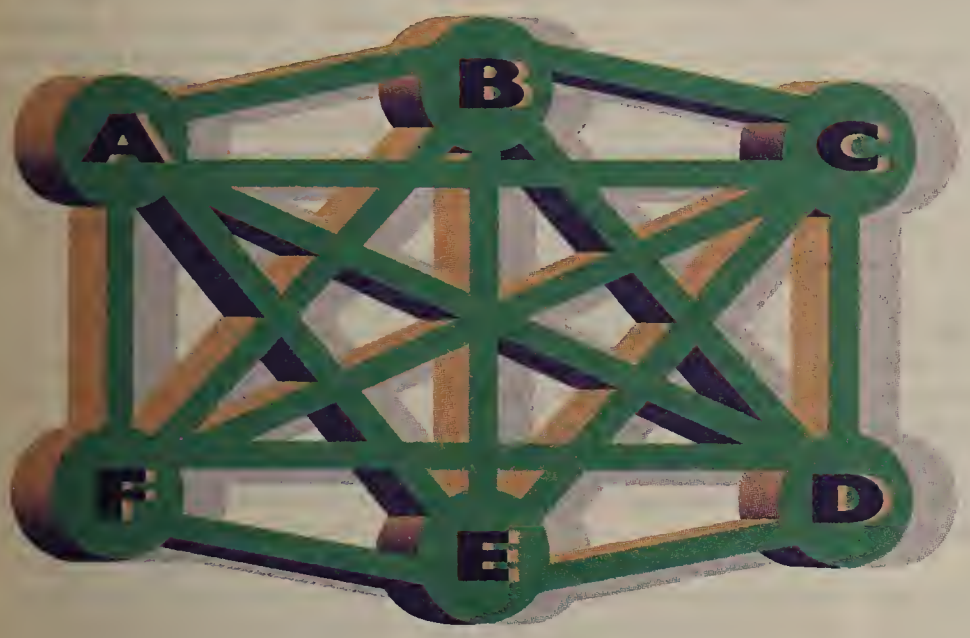
UP TILL NOW, the conventional way to build a LAN internetwork was to use private lines. And to connect each LAN to every other LAN or host. The management issues were

With Sprint LAN Reach X.25, you get a meshed network without the cost of redundant lines. And you get comprehensive management of LAN interfaces, communication lines, and modems.

there's even a free installation offer.

And LAN Reach X.25 is just one of our family of LAN services. Soon, our LAN Reach℠ 56 will be available. So you can enjoy

Traditional LAN Internetwork



SprintNet LAN Reach X.25

THESE LANS ARE THEIR LANS.

THESE LANS ARE OUR LANS.

a nightmare. And the costs were even worse. Which is why most people only connected a few of their LANs. Or none at all.

But now there's a simple, cost-effective solution. Sprint LAN Reach℠ X.25. To begin with, each LAN has only one point of connection. From that one point, any user on any LAN can talk simultaneously to any other user. And have full connectivity to mainframes, minis, databases and X.400 e-mail services. In a wide range of computing environments, including IBM.®

As a result, you'll have lower management overhead. You also get the inherent reliability that our automatic rerouting offers.

When you work with US Sprint,® you get a lot more help than you'll find anywhere else. Because SprintNet℠ is the largest public data network in the world. (In the past, we were known as Telenet.®) And we have the resources to give you a single-vendor source for design, implementation, and management of end-to-end network solutions.

As an extra advantage, all the benefits Sprint offers on our switched high-speed network.

If you'd like to see exactly how LAN Reach X.25 fits into your specific environment, call 1-800-326-5694.

In just a few minutes you'll have a complete package of information in your fax machine.

And we'll show you the best possible way to build an enterprise-wide network.

With a lot less lines. And a lot more help.

Sprint®

© 1990 US Sprint Communications Company Limited Partnership. ® IBM is a registered trademark of IBM Corporation.

Motorola: Spread spectrum won't make space for PCNs

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Following a year of tests, Motorola, Inc. has determined that spread-spectrum technology will not permit microwave facilities and personal communications network (PCN) devices to share the 1,850- to 1,990-MHz range.

The question of whether spread-spectrum technology will allow private microwave systems and PCN voice and data devices to operate in the same bandwidth lies at the heart of whether the Federal Communications Commission will force microwave users off this portion of the spectrum to make way for PCN services.

Motorola's evaluation was definitive that spread-spectrum techniques will not keep PCN devices from interfering with point-to-point microwave transmissions.

But other firms involved in PCN experiments disagree.

Officials at Millicom, Inc. and Local Area Telecommunications, Inc. (LOCATE), two companies also holding FCC experimental licenses to test spread-spectrum technology, say they will soon reveal the results of tests that show spread spectrum is a viable solution.

PCN technology — what the FCC calls Personal Communications Services (PCS) — calls for the use of microcell networks that support wireless voice and high-speed data links. Broad industry consensus points to the 2-GHz range as the best possible frequencies for operation of low-power PCN cells.

Thousands of microwave users currently use the 2-GHz band, however, and the FCC has authorized experiments to determine whether a solution can be found to accommodate the new PCN technology without displacing those users.

Motorola was one of several companies awarded experimental licenses to evaluate spread-spectrum technology as a way to allow the 1,850- to 1990-MHz range to carry both PCN and microwave signals.

"We've looked at all the spread-spectrum techniques," said Stuart Overby, Motorola's manager of technical programs. "Spread spectrum basically diminishes the strength of a signal over a wide-area range. But it's still not a cure-all. As you add more and more [PCN] units, it becomes harder to share."

Percy Batlivala, business unit manager of Motorola's paging and telepoint systems group, said Motorola researched the Chicago area and its demographics to determine the full extent of microwave use there, as well as power output from PCN units and their likely usage.

In a computer simulation, spread-spectrum tests of Code Division Multiple Access (CDMA), Frequency Division Multiple Access and Time Division Multiple Access showed improvements in sharing, but interference invariably results, Batlivala said. CDMA provided a 5-to-1 gain, but the benefit rapidly eroded when PCN systems were loaded in.

"We are contesting [the idea] that you can take a spread-spectrum approach to PCS," said Batlivala. "You can't overlay it and have it work."

Motorola validated its models in power tests performed against its own microwave system in Chicago.

Batlivala said the highest vulnerability was presented by PCN systems operated in the path of microwave systems.

Exclusion zones

The establishment of exclusion zones around microwave areas would allow the cohabitation of PCN and microwave, Batlivala said.

But Motorola has come to the conclusion that even cohabitation would only be possible in a local area such as a campus, not over a wide area.

In the second phase of its work, Motorola will assemble computer models of other major urban areas. And this year, the manufacturer will also build its first PCN system protoypes. That equipment will be tested in the Atlanta and Chicago areas.

> "Spread spectrum diminishes the strength of a signal over a wide area. But it's not a cure-all. As you add more units, it becomes harder to share."
>
> ▲▲▲

Correction: In the story "Voice reponse wins it place in the sun," (*NW*, April 22), Steven Levy's name was misspelled and his company, the investment bank Hambrecht & Quist, incorrectly identified. Also, AT&T and Syntellect, Inc. are expected to each account for 12% of the voice response market in 1991.

Ch

Ch

Have you noticed the way networks attract more and more hardware as they change?

It's a bridge box here. A router box there. A brouter box here.

Costly devils.

Which is why we've built NETBuilder.® It lets you switch from bridging to routing to brouting by changing a single software diskette. The hardware stays the same.

To simplify matters even more, NETBuilder's bridge, router and brouter have the same menu-driven user interface. So there's a common look and feel. Yet, you can still create custom menus to suit a particular network environment.

As a result, NETBuilder cuts three big expense items in internetworking—new hardware purchases, and the training and servicing to support it.

Yet, you sacrifice nothing for this simplicity.

System One outsources net

continued from page 1

tem One network managers in the new organization, some insiders said.

"Big decisions are being made internally in EDS on whether they need System One's backbone, especially for voice, or whether they can flop it over to the EDS [backbone network]," said a former System One network manager who requested anonymity. "There are opposing positions on this, and it's turned into a very political thing."

Merger plans afoot

Rex Carter, System One's vice-president of telecommunications in Houston, said System One's backbone network will initially be kept separate from EDS' backbone net.

System One's backbone is based on 176 fiber-optic T-1 lines supplied primarily by Williams Telecommunications Group, Inc., while EDS' backbone network is based on 900 T-1s and 130 T-3s supplied primarily by AT&T. Carter said System One and EDS hope to consolidate some System One network links onto EDS' backbone within 18 months to three years.

Howard Andrews, who left his job as a System One staff vice-president of telecommunications operations in January, said EDS was planning to dismantle most of System One's net.

"I was led to believe that [the merger would bring about] the demise of the System One network, which I thought would be wrong," he said.

Andrews now works as a network consultant in Houston.

Because System One's net serves travel agents located mostly in urban areas, Andrews said it could more economically carry traffic than EDS' network, which is optimized to serve General Motors Corp. manufacturing and engineering facilities.

Andrews said this is because System One's backbone nodes are closer to travel agencies, GM dealerships and General Motors Acceptance Corp. locations than EDS backbone nodes are and thus would save money by reducing the distance this traffic must travel before reaching the backbone net.

Carter agreed that the EDS and System One networks are optimized for different traffic. EDS' network, he said, handles mostly file transfers between EDS Information Processing Centers, while System One's net supports a large quantity of on-line transaction processing traffic.

But Carter said System One's network will not be dismantled and that the portions of it needed to support System One's business will remain.

Culture clash

Andrews said he believes that the outsourcing deal will cause a corporate culture clash between the entrepreneurial attitude of the System One employees and EDS' more conservative and bureaucratic style.

But others disagreed, saying System One and its employees will fare better under EDS because EDS is financially healthier than Continental.

"I think EDS will provide the focus and resources that System One has needed for some time," said Jeffery McKnight, a former System One vice-president of sales and service who is now vice-president of marketing and strategic planning at Aeronautical Radio, Inc. in Annapolis, Md.

"I think the financial problems of [Continental Airlines] hindered System One's ability to move at the rate the market demanded," he said.

American Cyanamid net to link U.S., European offices

France Telecom chosen to provide net services.

By Barton Crockett
Senior Editor

NEW YORK — France Telecom has landed a multimillion-dollar contract to provide international circuits and hubbing facilities for an advanced international network that American Cyanamid Co. is deploying, according to sources.

American Cyanamid will use three 128K bit/sec circuits on the Trans-Atlantic Telecommunications-8 and Private Trans-Atlantic Telecommunications fiber cables to link company offices in New Jersey to a network hub in Paris, sources close to the deal said.

The Paris hub, which will be maintained on France Telecom's premises, will be linked to American Cyanamid offices in Belgium, France, Germany and the U.K. via multiple 64K and 128K bit/sec circuits. It will carry data traffic and voice signals compressed to 6K bit/sec.

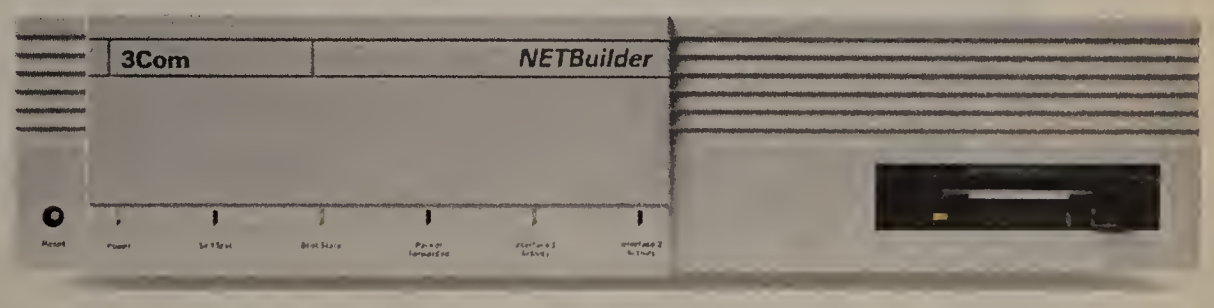
The international network is expected to improve American Cyanamid's international communications by enabling the company's European offices to use the same abbreviated dialing plan as offices on American Cyanamid's domestic AT&T Software-Defined Network (SDN).

The international net, which is expected to help American Cyanamid save money, should be operational by the end of the year.

The network will also support an innovative off-net access feature that will enable users in Europe to dial through the public switched network into the Paris hub and walk through a series of voice prompts in order to complete calls to locations on the private net in Europe or on the SDN in the U.S.

The deal represents the largest international services contract landed by France Telecom's U.S. unit in more than a year. France Telecom's largest U.S. customer for international net services is General Electric Co.

Ch Changes.



NETBuilder's bridging, routing and brouting offer top performance for local area connections and wide area connections.

The result is modular internetworking that lets you manage changes on your network intelligently.

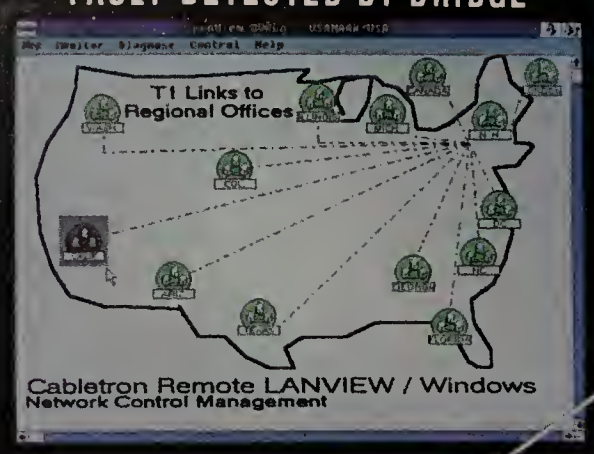
But why not see for yourself? Just call **1-800-NET-3Com** Dept. D6557. You'll find the more things change on your network, the more they can stay the same.

3Com®
We network more types of systems to more types of systems.™

©1990 3Com Corporation, 5400 Bayfront Plaza, Santa Clara, CA 95052. Telephone (408) 764-5000.
3Com, NETBuilder and the 3Com tagline are trademarks of 3Com Corporation.

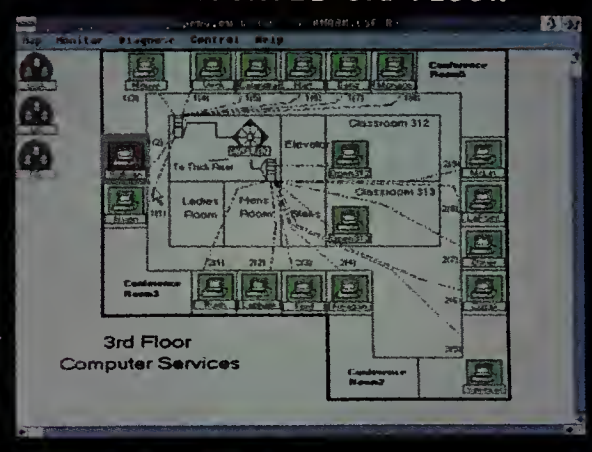
10BASE-T NETWORK MANAGEMENT MADE EASY.

FAULT DETECTED BY BRIDGE



Click...

FAULT LOCATED-3rd FLOOR

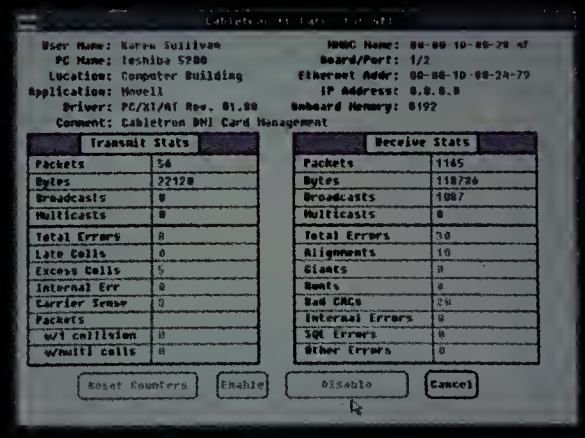


Click...

DISPLAY HUB STATISTICS

Click...

DISPLAY PC CARD STATISTICS



Click...

Cabletron's Remote LANVIEW™/Windows is the world's first network management software package to offer completely integrated world-wide desktop LAN/WAN management from a central control console.

With just a click of your Personal Computer's mouse, Remote LANVIEW™/Windows allows you to manage Cabletron's complete line of ***Ethernet*** and ***Token Ring*** products including twisted pair, coaxial and fiber hubs. Remote LANVIEW™/Windows also lets you manage Cabletron's local and wide area bridges as well as the 48 different types of DNI™ PC cards currently available.

Cabletron's Remote LANVIEW™/Windows lets you maximize network efficiency by providing color-coded mapping, alarm indicators, complete throughput and error breakdown features. Features you can't afford to do without. Features which make the job of managing your complex network easier than ever.

Call today for details or a live demonstration.

CABLETRON SYSTEMS

The Complete Networking Solution

A New York Stock Exchange Company

CORPORATE HEADQUARTERS
CABLETRON SYSTEMS INC
Cabletron Industrial Park
Rochester NH 03867
603-332-9400

INTERNATIONAL OPERATIONS
CABLETRON SYSTEMS LTD
Newbury Berkshire UK RG13 2PZ
011-44-635-580000

Worth Noting

"All in all, [the Federal Telecommunications System 2000 contract] is a project I feel very good about. It's the kind of project any taxpayer would feel good about."

William Esrey
Chairman and chief executive officer
United Telecommunications, Inc./US Sprint Communications Co.
Kansas City, Mo.

People & Positions

Charles Jepson last week was named president and chief executive officer of **Touch Communications, Inc.**, a Campbell, Calif., maker of Open Systems Interconnection software.

Previously, Jepson was vice-president and general manager for the Information Presentation Division at Software Publishing Corp.

Bruce Irvine, Touch's vice-president of engineering, had taken over as interim president for the previous six months.

Irvine had replaced **Bill Fello,** who left Touch last year in order to pursue other interests.

GE Information Services (GEIS), a Rockville, Md., value-added network service provider, recently named **John Barber** general manager of the GEnie Service, the company's on-line information service.

Barber will be responsible for business strategy at GEnie. In addition, he will attempt to expand the service's presence abroad.

A 22-year veteran of General Electric Co., Barber previously was manager of GEIS' Asia-Pacific programs.

He replaces **William Louden,** who is currently working at GEIS on a special project involving third-party data bases, according to a company spokeswoman.

Racal Data launches major marketing reorganization

Firm melds 5 subsidiaries into new business units.

By Eric Smalley
Senior Editor

Racal Data Communications Group last week acknowledged it is recasting its five subsidiaries into three or four business units that will address different areas of the networking market.

The move is an effort to provide a more logical approach to the market, with business units organized to compete in industry segments rather than separate companies formed around product lines, according to a company spokeswoman.

Racal, a subsidiary of the British company Racal Electronics PLC, had consisted of Racal-Milgo, Racal-Milgo Sky Networks, Inc., Racal-Quanta, Inc., Racal-Vadic and Racal InterLan, Inc.

Under the reorganization, Racal Data Communications Group will form a wide-area networking unit, an internetworking unit and a network management unit. A fourth unit may also be formed for an undisclosed purpose, according to the spokeswoman.

Racal InterLan will become the internetworking business unit of Racal Data Communications Group.

As part of the corporate shuffle, Racal InterLan President Randy Phillips has resigned and Robert Steinkrauss, former vice-president of finance for Racal-Milgo, has been named general manager of the internetworking business unit. Before joining Racal-Milgo, Steinkrauss had been vice-president of finance and manufacturing operations at Racal InterLan. The internetworking business unit will continue to be located in Boxborough, Mass.

As a preliminary move in the reorganization, Racal-Vadic of Milpitas, Calif., and a portion of Racal-Milgo Sky Networks of Charlotte, N.C., have been folded into Racal-Milgo of Sunrise, Fla.

Just how Racal-Milgo, Racal-Quanta and the remaining elements of Racal-Milgo Sky Networks will be reorganized into the WAN and network management units has yet to be determined.

Along with the reorganization comes consolidation. According to the spokeswoman, 350 Racal-Milgo workers, or 13% of its workers, have been laid off.

Further layoffs are not expected at Racal InterLan, which trimmed its work force by 230 people, or 7%, in February.

INDUSTRY BRIEFS

Sterling Software to buy REDINET. Sterling Software, Inc. last week said it intends to buy the assets of Control Data Corp.'s REDINET Services Division, a supplier of electronic data interchange network services and software. The financial terms of the transaction, which is expected to close before July, were not divulged. The REDINET operations will be included in Sterling Software's Ordernet Services Division.

MCI reports record revenue. MCI Communications Corp. last week reported record revenue for its first quarter, ended March 31, of $2.03 billion, up 12% from revenue of $1.81 billion in the first quarter last year. The carrier's earnings fell to $123 million in the first quarter, down 21% from earnings of $156 million in the first quarter of 1990.

MCI attributed its revenue growth to the acceptance of new services for both large and small customers, the signing of contracts with large users, such as AMR Corp., and the inclusion of revenue from Telecom*USA, Inc., which MCI purchased in August 1990.

Iowa net construction to start. Construction has started on a fiber-optic T-3 network that will link schools and government agencies throughout the state of Iowa, according to Kiewit Network Technologies, Inc. Kiewit, based in Omaha, Neb., was the successful bidder on the project, which is expected to take more than two years to build and cost about $112 million, according to Jeff Held, a partner at Network Strategies Practice, a network consultancy of Ernst & Young in

(continued on page 8)

FCC stance on global spectrum allocation

FCC proposal	Industry comment
FCC proposes to allocate 2,110 to 2,130 MHz and 2,160 to 2,180 MHz to geostationary satellites for mobile satellite services.	RBHCs and Telocator oppose proposal because of disruption to common carrier microwave and paging services.
FCC proposes to allocate 1,850 to 1,990 MHz for LEO satellite system, subject to spectrum sharing studies.	Three PCN firms oppose proposal, maintaining that those bands are ideal for PCNs and doubting whether cosharing with LEO systems is possible. Four groups, representing users of private microwave nets, oppose proposal on the basis that sharing is probably not feasible.
FCC opposes international PCN allocation.	Apple Computer, Inc., IBM, Motorola, Inc. and NCR Corp. urge the FCC to seek international PCN allocation to ensure that PCN equipment can be used anywhere worldwide.

LEO = Low-earth orbit PCN = Personal communications network

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FCC, WASHINGTON, D.C.

Firms assail FCC's int'l spectrum stance

Carriers, equipment makers scramble to influence U.S. strategy on global allocation of radio spectrum.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Just two months before the U.S. must finalize its position on international spectrum allocation for an upcoming conference, carriers and equipment vendors are asking the FCC to rethink the positions it has staked out.

Several regional Bell holding companies oppose a Federal Communications Commission plan to reallocate a portion of the domestic radio spectrum for use by geostationary satellites. Meanwhile, computer manufacturers and others are asking the FCC to support a European and Canadian effort to reach an agreement on global allocation of radio frequencies for personal communications networks (PCN), the emerging microcell technology.

The FCC is developing a U.S. stance on spectrum allocation for the World Administrative Radio Conference (WARC) '92, which is scheduled for next March in Spain. At the conference, representatives from 166 countries will meet to hammer out new agreements on matters including allocation of international spectrum for low-earth orbit (LEO) satellite service and PCNs.

Although WARC is still a year away, the U.S. Department of State must submit its negotiating position by June to the International Telecommunication Union, the U.N. organization conducting the conference.

But the recent FCC proposal to allocate the 2,110- to 2,130-MHz band and the 2,160- to 2,180-MHz band to geostationary satellites for mobile satellite services has riled several RBHCs (see graphic, this page).

The RBHCs, which currently provide extensive telephone, cellular and paging services via point-to-point microwave in the 2.1-GHz band, say they face displacement if the FCC's proposals are adopted at WARC.

In its March 20 supplemental notice of inquiry concerning WARC, the FCC stated that sharing between mobile satellite services and point-to-point microwave did not appear feasible. Thus, the commission said it intended to "reaccommodate these domestic users as the mobile satellite service is implemented."

> The RBHCs say they face displacement if the FCC's proposals are adopted at WARC.
>
> ▲▲▲

The FCC asserted that "the common carrier microwave higher frequency bands are being vacated by many commercial users because this traffic is being moved to fiber-optic cable."

However, three RBHCs attacked the statement as false.

Two Pacific Telesis Group companies — Nevada Bell and

(continued on page 8)

Firms assail FCC's stance

continued from page 7

Pacific Bell — were among those filing comments with the FCC. "The Pacific companies have over 100 routes where these frequencies are the only economically feasible way to provide service to customers in certain remote areas," the filing said.

US West, Inc. has estimated it would lose tens of millions of dollars in microwave equipment investment under the FCC's proposals.

Users also questioned the FCC proposal to allocate the 1,850- to 1,990-MHz bands for a LEO mobile satellite system.

Motorola, Inc. had asked the commission for bands in the 1,610-MHz range for its planned LEO satellite called Iridium.

The FCC said putting LEO into the 1,850- to 1,990-MHz band will give the commission room to decide how to use the band in the U.S. for PCNs, fixed services and mobile satellite services.

Local Area Telecommunications, Inc. (LOCATE), a wireless telecommunications company providing alternate access communications through a microwave network, argued that the 1,850- to 1,990-MHz frequencies are best suited for PCNs.

LOCATE, now conducting PCN experiments, noted that sharing between mobile satellite services and PCNs will likely be impossible. Its comments to the FCC were echoed by American Personal Communications, Inc., another PCN experimental license holder.

On yet another front, the FCC has so far shown little interest in establishing a global PCN spectrum allocation to allow international "roaming" for voice and data devices operating on the same frequency, despite efforts by European countries and Canada to get the project under way. A global PCN allocation would enable users to transport and use voice and data PCN equipment anywhere in the world.

Four large computer manufacturers asked the commission to rethink the issue, recommending that at least 10 MHz be allocated between 1,850 and 2,000 MHz for international roaming.

In the last few weeks, Apple Computer, Inc., IBM, Motorola and NCR Corp. have called on the FCC to support the multinational interest in establishing a global PCN allocation.

In particular, the four companies want any PCN equipment they manufacture to operate on the same frequency.

Don Johnson, senior consulting engineer in the technology and development division at NCR, noted that an international allocation would hold down manufacturing costs by eliminating the need to build to regional frequencies. The cost to the end user would be lower, and "you could carry each unit internationally," he said.

Industry Briefs

continued from page 7

Vienna, Va. The Iowa net project has been delayed several times during the past few years ("Iowa T-3 net is a political hot potato," *NW*, April 1).

Proteon to go public. Proteon, Inc. has filed a registration statement with the Securities and Exchange Commission for an initial public offering of 3.1 million shares of common stock. The offering will be underwritten by a syndicate of underwriters and managed by Montgomery Securities and Hambrecht & Quist, Inc.

Outsourcing consulting group formed. Ledgeway/Dataquest, a subsidiary of The Dun & Bradstreet Corp., recently announced the formation of a group that will focus on research and consulting for the professional services industry.

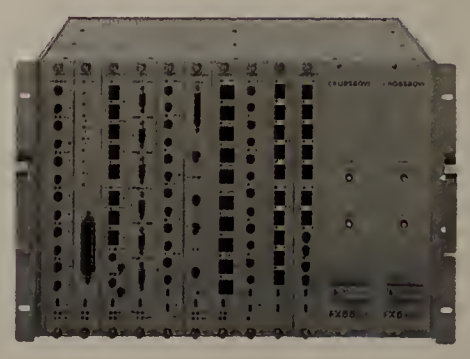
Ledgeway/Dataquest, which conducts research on customer service in the computer and networking industry, formed the professional services group because of the accelerating growth of outsourcing and systems integration. John Torres, a Ledgeway/Dataquest vice-president and former IBM National Service Division official, has been named director of the new group.

Mixed-protocol environments call for Crossbow, the hub that speaks so many LAN-guages. Like Token Ring at 4 and 16 Mbps. Ethernet, including 10BaseT. AppleTalk. And Apollo Domain.

Crossbow is equally fluent in all media types. So one hub easily supports shielded and unshielded twisted pair wiring, thick and thin coax, and fiber-optic cabling, linking existing and expanding LANs.

This intelligent cabling system also communicates a wide range of LAN diagnostics and status reports to your desktop through LightWatch, the hub's graphics-based network management software. And LightWatch gives you control of every port on every card in every hub.

Call Fibermux today at **(818) 709-6000** for Crossbow, the most versatile cabling hub. It's LAN fluent.



Crossbow Workstation Networking Hub

Ethernet (and 10BaseT), Token Ring, AppleTalk, and Apollo Domain
Redundancy in Power, Modules, Links, and Ports
Network Interface Cards and Media Converters
Graphic Network Management with SNMP
Multiple Logical LANs in One Hub
20-,40-, and 100-Port
Hub Capacity

FOR SERIOUS NETWORKS

Fibermux. LAN Cabling Hubs. We're Serious.

Copyright © 1990, Fibermux Corporation • 9310 Topanga Canyon Blvd. Chatsworth, CA 91311 • (818) 709-6000 • FAX (818) 709-1556

Worth Noting

"It would be an operational nightmare for us to plan for caller ID on a state-by-state basis and adjust our business practices accordingly."

Deborah Groves
Communications manager
Fingerhut Companies, Inc.
Minnetonka, Minn.

Carrier Watch

AT&T recently announced that it has signed two new Tariff 12 custom voice/data network deals and has renegotiated a third.

Airborne Express of Seattle signed a three-year, $12 million contract, while The Travelers Corp. in Hartford, Conn., awarded AT&T a three-year, $42 million contract.

AT&T renegotiated a prior $30 million contract to provide additional features to Hartford-based Aetna Life & Casualty Co. and expand the agreement to include additional company divisions. The new agreement increases by $5 million the insurance firm's commitment to AT&T and extends the length of the agreement by one year.

AT&T will provide Airborne Express with a customized voice/data network for its offices and subsidiaries nationwide. Under the agreement, the carrier will provide Airborne Express centralized service management to oversee network performance, custom billing and network maintenance.

Airborne Express' current network links its general office computer center in Seattle to the company's nationwide network of field service offices.

AT&T will provide Travelers with network services, billing, installation and network management.

The custom net will serve more than 300 company locations, including regional offices, customer service and processing centers.

New Tandem API allows NonStops to link to PBXs

NonStop users can form links to ANI services.

By Bob Wallace
Senior Editor

CUPERTINO, Calif. — Tandem Computers, Inc. last week announced an application program interface (API) that will enable users and software vendors to develop programs to link private branch exchanges and Tandem NonStop minicomputers.

Programs based on Call Applications Manager will allow customers with AT&T and Northern Telecom, Inc. PBXs to build applications that use information gathered by automatic number identification (ANI) and dialed number identification services.

Call Applications Manager integrates Northern Telecom's Meridian 1 and Meridian SL-1, AT&T Definity Communications Systems and System 85 PBXs, or those switches configured as automatic call distributors, with Tandem NonStop VLX, CLX, Cyclone and TXP minicomputers.

Programs based on Call Applications Manager will help users streamline customer service, order entry and telemarketing operations by speeding call center agent access to customer profiles on Tandem computers.

Programs that use the Tandem API could be designed, for example, to allow ANI data to be sent to the host before the incoming call is answered. The ANI data could be used to retrieve the customer's profile, which would be forwarded to the agent with the call.

Call Applications Manager software runs under Tandem's Guardian operating system and must be used in conjunction with Tandem's data definition language, Enable program generator, Enscribe file management system and Pathway distributed transaction processing system.

Customers with NonStop CLX and Cyclone computer systems must use a Tandem 3605 controller board in the unit to support communications with the switch, while users with NonStop VLX and TXP computers must use either a 6105 or 6204 controller board.

In order to utilize programs based on Call Applications Manager, Northern Telecom customers must augment their switches with the Meridian Link package, a Motorola, Inc. 68030-based unit that can be added internally to a Northern Telecom PBX or run on an adjunct processor. The Link

(continued on page 12)

WASHINGTON UPDATE

BY ANITA TAFF

Tariff 12 to include switched digital service. AT&T last week expanded the services available under Tariff 12 by adding switched digital service to off-net locations. In March, AT&T officials said they were planning to add the service to Tariff 12 after several users complained publicly that the capability was not available through Tariff 12 but was available under AT&T's Software-Defined Network service.

Due to the high demand for switched digital service, AT&T decided to incorporate the offering into the general regulations of Tariff 12 so that all of its customers could purchase it, rather than adding it individually to each custom network deal.

AT&T offers Treasury int'l calling discounts. AT&T recently introduced a new international calling plan for the U.S. Department of the Treasury. The deal, dubbed Government International Network Service, is filed under AT&T's Tariff 16 for competitively bid government services. It is scheduled to take effect June 1.

The new service will allow the Treasury Department to make international calls from its Software-Defined Network. Those calls will be charged at AT&T's tariffed rates for various countries, but the department will qualify for volume discounts. The department will receive a 20% discount on calls placed during the day, a 5% discount on evening calls and a 5% discount on nighttime calls. In its filing at the Federal Communications Commission, AT&T said it expects to make $958,550 in profit over three years from the deal.

AT&T's SDDN rates
Effective May 24

Mileage band	First 18 seconds	Each additional 6-second increment
0 to 55	$0.614	$0.045
56 to 292	0.676	0.065
293 to 430	0.736	0.085
431 to 925	0.773	0.098
926 to 1,910	0.773	0.098
1,911 to 3,000	0.785	0.102
3,001 to 4,250	0.846	0.122
4,251 to 5,750	0.846	0.122

Rates apply to SDDN 384K bit/sec calls, which originate from and terminate at on-network locations using digital special access. AT&T's usage reduction plan provides a discount of 5% on the total amount of intrastate, interstate and international SDN usage charges exceeding $10,000 in a billing month.

SDDN = Software-Defined Data Network
SDN = Software-Defined Network

GRAPHIC BY SUSAN J. CHAMPENY — SOURCE: AT&T, BRIDGEWATER, N.J.

Greene reexamines ban on info services

Users, carriers offer opposing opinions on whether threat of RBHC anticompetitive behavior exists.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — U.S. District Court Judge Harold Greene heard arguments recently concerning the factors he may consider when reviewing whether to lift the ban prohibiting the RBHCs from providing information services.

Greene was forced to take a second look at the issue after a federal appeals court last year ruled that he had made a legal error in deciding to keep the ban in place during a 1987 review of the Modified Final Judgment. The same court ruled that Greene was correct in maintaining the bans on manufacturing and provision of long-distance services.

In an about-face, the U.S. Department of Justice, the agency responsible for negotiating the original ban in the Modified Final Judgment, is pushing Greene to lift the information services ban. The Justice Department says it now believes there is no real possibility that the regional Bell holding companies would act anticompetitively or purposely discriminate against competitors.

Greene, who points out that 99% of all voice and information service traffic moves across the RBHCs' local loops, is unconvinced. But he was unsure at the hearing about how much latitude the appeals court has left him in deciding the fate of the information services ban.

Greene also said he is unclear how heavily he may weigh the RBHCs' past anticompetitive behavior or the effectiveness of Federal Communications Commission regulation in deciding whether such problems are likely to arise in the future.

The possibility of allowing the RBHCs to provide information services has sparked harsh criticism from consumer and user groups. They claim that the RBHCs may use their resources to drive competitors out of the market, thus limiting user choice and possibly raising prices.

But none of the principal parities to the Modified Final Judgment — AT&T, the RBHCs or the Justice Department — oppose

(continued on page 12)

Consent Decree milestones

Jan. '84	Consent Decree takes effect.
Aug. '87	U.S. District Court Judge Harold Greene rules in first triennial review. Maintains ban on RBHC manufacturing, long distance and provision of information content.
Nov. '87	RBHCs appeal ruling.
April '90	Appeals court upholds ban on manufacturing and long distance. Orders Greene to reconsider ruling on information services.
April '91	Greene hears argument on whether to lift the information services ban.

GRAPHIC BY SUSAN J. CHAMPENY

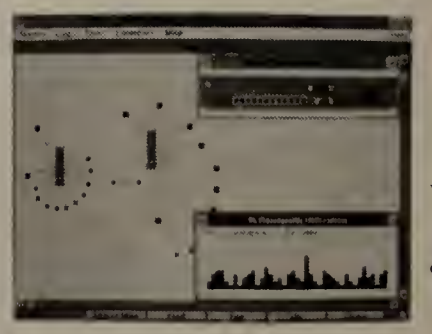
© 1991 AT&T. StarGROUP and SYSTIMAX are registered trademarks of AT&T
All other brand or company names are trademarks of their respective owners

Sec

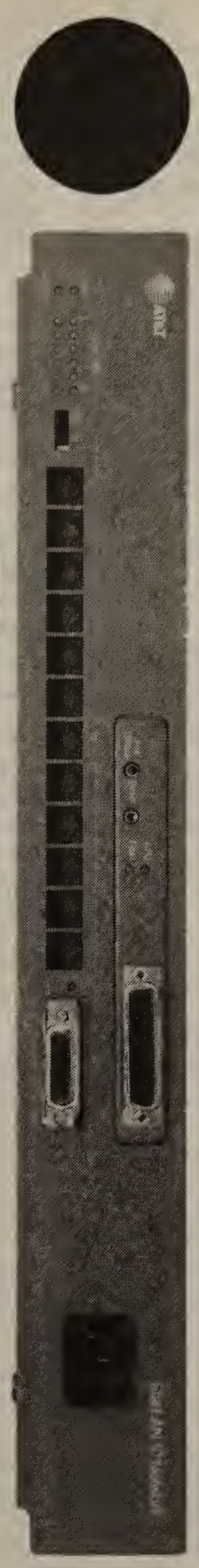
A LAN is a LAN. Right? Wrong. The AT&T StarLAN 10 SmartHUB is more secure, easier to manage, and a better investment than any other Ethernet® hub. Read on to learn why.

Data Security. Ethernet LANs are by nature very accessible – sometimes too accessible. Idle users and hackers always find ways to pick off passwords and other private information from unsecured networks. But the StarLAN 10 SmartHUB foils intruders and stymies eavesdroppers, thanks to its ability to store and analyze a distinctive address for every device in your network. This unique security system selectively scrambles data – preventing people from intercepting information that isn't meant for them – and notifies the system administrator should unauthorized users attempt to transmit. And only AT&T has it.

Management Security. Or, more precisely, the comfort of total control. Because SmartHUB enables remote network management via SNMP, draws multi-tiered maps of your LAN, generates real-time error and traffic reports, and highlights alarms in color – all saving your time, money, and sanity.



Infinity.



AT&T StarLAN 10 SmartHUB

Investment Security. The StarLAN 10 SmartHUB supports the key standards of the Ethernet arena: IEEE 802.3, 10BASE-T, TCP/IP, Novell® NetWare,® Banyan® VINES,® DECNet® PCSA, and the AT&T StarGROUP® LAN Manager network operating system. It works with unshielded twisted-pair and fiber-optic distribution systems like AT&T SYSTIMAX® PDS, as well as coaxial schemes. And compact, modular SmartHUBs can be rack-mounted for maximum growth potential in a minimum of space.

	AT&T	Cabletron Systems	SynOptics™ Communications
Ports Locking	Yes	Yes — MMAC-3 No — MRXI-2	Yes
Intrusion Control	Yes	Yes — MMAC-3 No — MRXI-2	Yes
Eavesdrop Prevention	Yes	No	No
Map Generation	Yes	Yes	Yes
User Movement Alarming	Yes	No	Yes
List Price/Port*	SmartHUB $253	MMAC-3 $391 MRXI-2 $338	LattisNet® Series 3030 $525 LattisNet® 2310 $319

*Based on 36 ports including network management

All at a price-per-port 20%-50% *below* our competition (see chart).

For more information about the AT&T StarLAN 10 SmartHUB, see your AT&T Account Executive or Authorized Reseller, or call 1 800 247-1212, Ext. 831F. (In Canada, 1 800 387-6100, Op. 19.)

AT&T
Computer Systems

Users praise US Sprint's efforts in FTS 2000 net

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Although government network managers at a recent conference here were generally satisfied with the service provided on US Sprint Communications Co.'s portion of the massive Federal Telecommunications System (FTS) 2000 network, many said they want to see lower prices and an improved dialing plan.

The roughly 100 network managers who attended the 1991 Federal Government Users' Conference offered good reports on US Sprint's ability to quickly cut over agencies to the FTS 2000 network, but some complained that prices under the FTS 2000 contract are too high in comparison with commercial prices.

At the conference, sponsored by US Sprint for its federal agency customers, Steve Broadbent, chairman of the Network B Executive Users' Council and deputy assistant for information systems at the Department of the Treasury, said, "All in all, we're enthusiastic about what Sprint has done."

But Broadbent also took the opportunity to air a grievance about the custom FTS 2000 numbering system, which he said is resulting in higher-than-expected telecommunications costs.

The original contract called for a seven-digit numbering plan for on-net calls made on FTS 2000, Broadbent said. But because there is no FTS 2000 phone directory, users tend to use the otherwise-available 10-digit numbers, resulting in more expensive off-net calls.

"We've seen significant costs added to the contract because of this," Broadbent said. "We may be helping US Sprint's cash flow, but not the government's."

Broadbent said he had approached the carrier to ask it to install a number-conversion system to automatically translate 10-digit numbers into seven-digit numbers to keep calls on net.

"Why should we put the burden on the user [rather] than on the systems processor?" he said. But Broadbent said US Sprint told him it would take several years to remedy the problem.

He and some other managers acknowledged that FTS 2000 prices sometimes are higher than commercial sector rates.

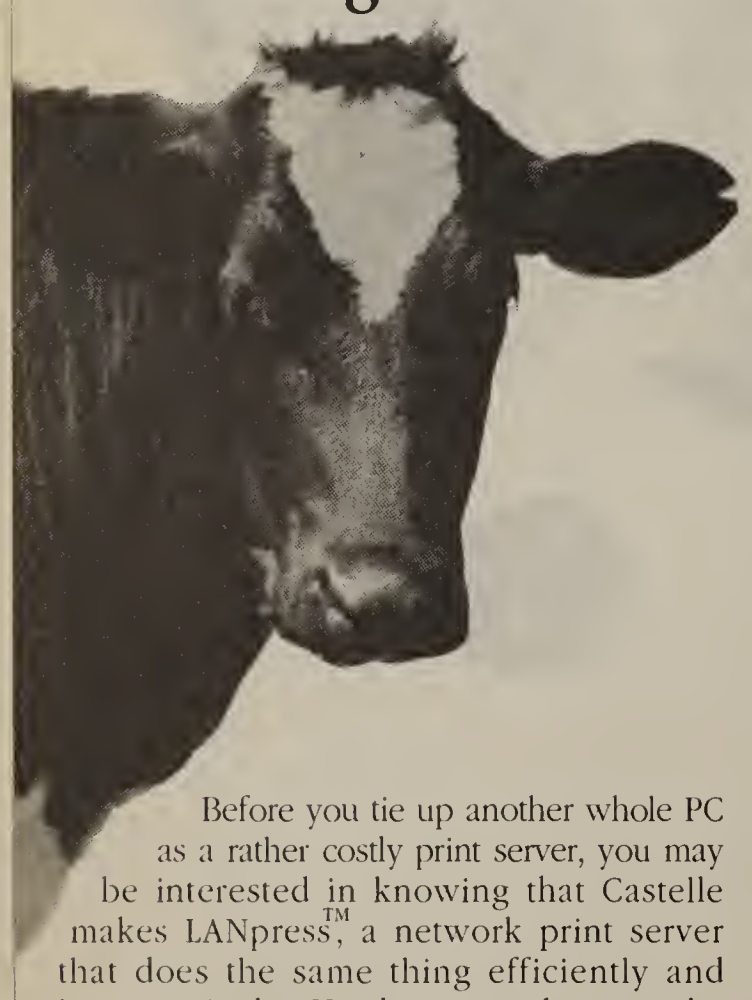
Broadbent also urged users and US Sprint sales representatives to work more closely together to help the government get the most efficient, cost-effective service for applications.

"We need to make the Sprint account team feel accountable on FTS 2000," said Broadbent. "We need to start talking about applications needs to Sprint. We need to have them realize that their job is to maximize the value of FTS 2000 to us, not their cash flow."

Separately, Mike Corrigan, General Services Administration assistant commissioner for telecommunications services, told Congress that the Inter-Agency Management Council rated US Sprint as more responsive than AT&T in assisting them to prepare for transition and in getting them onto the FTS 2000 net.

"The quality of service provided is excellent" from both [service providers], but users expressed concern in the "management of services," Corrigan said.

It would be like buying a cow for a glass of milk.



Before you tie up another whole PC as a rather costly print server, you may be interested in knowing that Castelle makes LANpress™, a network print server that does the same thing efficiently and inexpensively. Hook one end up to the network printer. The other to the network cable. You're done.

LANpress needs no special spooling software. Connects up to as many as four printers. Is 100% Novell compatible (even NetWare 386). Supports CAPTURE, NPRINT, and PCONSOLE, and up to 8 file servers and 32 queues. LANpress also works with Ethernet (thick or thin) or Token Ring. Is smaller than a breadbox. Doesn't moo.

If someone is telling you that the only print server worth its salt is a dedicated PC, they're giving you a bum steer. Call us if you need some more convincing or if you would like to order LANpress.
1-800-359-7654

Network Printing by
CASTELLE

LANpress is a trademark of Castelle, Inc., 3255-3 Scott Blvd., Santa Clara, CA 95054 (408) 496-0474. Other brand names are trademarks or registered trademarks of their respective holders.

Greene reviews info services ban

continued from page 9

lifting the ban.

Due to this lack of opposition, the appeals court ruled that Greene should have used a more lenient legal standard than the one he applied in 1987. He ruled that the bans should stay in place because there was a substantial possibility that the RBHCs could use their monopoly over the local loop to thwart competition.

Nancy Garrison, senior appellate and communications counsel in the Justice Department's Antitrust Division, argued that due to the new legal standard Greene must use, he can leave the ban in place only if he is certain the RBHCs will act abusively. She said the agency may have overreacted in 1982 by placing the ban on information services and since then, much has changed to warrant eliminating the restriction.

"In the years since [divestiture], we found significant differences between the way things operated in the past and the way we think they are likely to operate in the future for information services," Garrison said. "The motion [to lift the ban] should be denied only if it would be certain to lessen competition," she said.

Although Greene has reservations about that, Garrison claims that the appeals court said Greene must give strong deference to the agency's desire to lift the ban and there is little choice but to approve the alteration.

But Greene bristled at the idea that he has no choice but to rubber-stamp the Justice Department's recommendation to lift the ban. He said it wouldn't make sense if the case "goes back to court but the court is powerless to do anything about it."

He also seemed exasperated that the same agency that originally instituted the ban on information services is now pushing so hard to have it lifted. "It does seem strange that the department, with no new evidence, changed its mind like that because new people came in," Greene said, referring to the deregulatory philosophy that came in vogue with President Reagan.

Attorneys opposed to the RBHC and Justice Department position rallied behind Greene at the hearing. "All the department has done is rubber-stamp and endorse the RBHCs' position, and that's not entitled to deference," said Chester Kamin, an attorney representing MCI Communications Corp. and others opposed to lifting the ban.

He said the RBHCs have shown a consistent pattern of misconduct since divestiture, and there are hundreds of complaints on record from competitors that say they have been overcharged or even denied service, Kamin said.

Besides determining how likely it is that the RBHCs could misuse their size and resources to damage the market, Greene must also consider if current regulations are adequate to prevent abuse if the local carriers were to provide information services.

Former FCC Chairman Richard Wiley, arguing for opponents of lifting the ban, said, "The regulations of the FCC simply aren't up to snuff." FCC officials insist that new regulatory structures — such as Open Network Architecture, designed to unbundle access to the network, and price caps, theoretically able to stop cross-subsidies — will protect users.

"The ballyhoo has far exceeded reality" concerning the capability of the new rules to stop anticompetitive behavior, he said. "I don't think the rules really are different than the rules in effect in my days [at the FCC] that failed to stop cross-subsidies.

"Due to the irrationality of the department's argument [that the FCC can prevent anticompetitive behavior], it is incumbent on [Greene] to look at the efficacy of the regulations," he added.

New API allows NonStop link

continued from page 9

supports X.25 messaging with the Tandem NonStop.

The Northern Telecom PBX must be running X11, Release 13 or later operating software. Meridian Link costs about $30,000 and is available now for Meridian 1 Options 21 to 71 and existing Meridian SL-1 PBXs.

AT&T PBX customers will have to supplement their switch with the vendor's Integrated Services Digital Network Gateway. The software runs on an AT&T 3B minicomputer and provides an X.25 link to the Tandem minicomputer. System 85 switches must be running Release 2 Version 4 operating software in order to use the software.

ISDN Gateway is available now for Definity Generic 1 and 2 PBXs and the System 85 switch.

Tandem Alliance support

Tandem also announced that several Tandem Alliance members will modify existing NonStop-based call-center applications to incorporate Call Applications Manager. The Tandem Alliance program encourages the development of application software that runs on Tandem computer systems.

Dave Coleman, strategic alliance program manager for Northern Telecom, said he expects that Call Applications Manager will be used widely in financial services, manufacturing, telemarketing and retail companies. "[Call Applications Manager] will be used primarily for order processing, billing and helpdesk applications."

Call Applications Manager software will be available from Tandem in the third quarter of 1991. A onetime site license for Call Application Manager ranges from $11,310 for the NonStop CLX to $59,570 for the NonStop Cyclone.

Companies Grow. Technologies Change. Networks Fail.

Building a facility network requires many decisions. And none is more critical to the network's success than your choice of smart hubs.

In the interest of survival, then, here are four things you should know.

Reliability. The cost of network downtime can be astronomical in terms of lost business and decreased productivity. To survive, full-time networking is critical. With Chipcom's ONline™ System Concentrator, you can build a totally fault-tolerant facility network that switches around broken cables and failed components, and reroutes network traffic without users even knowing a problem exists.

Flexibility. Your facility network must be able to handle today's technology, like Ethernet and Token Ring, yet be open to tomorrow's, such as FDDI. The ONline System Concentrator's modular design makes it easy. And its TriChannel™ architecture means each hub can run up to three concurrent networks—Ethernet, Token Ring or FDDI—in any combination, without additional backplanes.

Manageability. A hub that merely tells you there's a problem is no longer good enough. Chipcom's ONline Network Control System has the power to reassign, balance and reconfigure, without rewiring or shutdown, to suit changing network conditions. For the first time, you control your network. Instead of the network controlling your company.

The real cost of networking. The good news is that this reliability, flexibility and manageability can actually cost your company less. To find out how, and for more information on Chipcom's ONline System Concentrator, call **1-800-228-9930.** GSA# GSOOK90AGS5185

CHIPCOM™
NETWORKING AS IT WILL BE

Survival Gear.

ONline and TriChannel are trademarks of Chipcom Corporation.

© 1991 Chipcom Corporation, Southborough Office Park, 118 Turnpike Road, Southborough, MA 01772

V.32 Smorgasbord

UDS offers more choices, more features than any other modem builder

UDS, acknowledged by leading trade magazines and independent research organizations as the world's premier supplier of V.32 modems, offers more variations on the V.32 theme than any other manufacturer.

Beyond basic V.32 conformity lies a myriad of features and options. Among the user options available are:

PACKAGING—Board-level IBM plug-ins, standalone packages or central site rack-mountable cards.

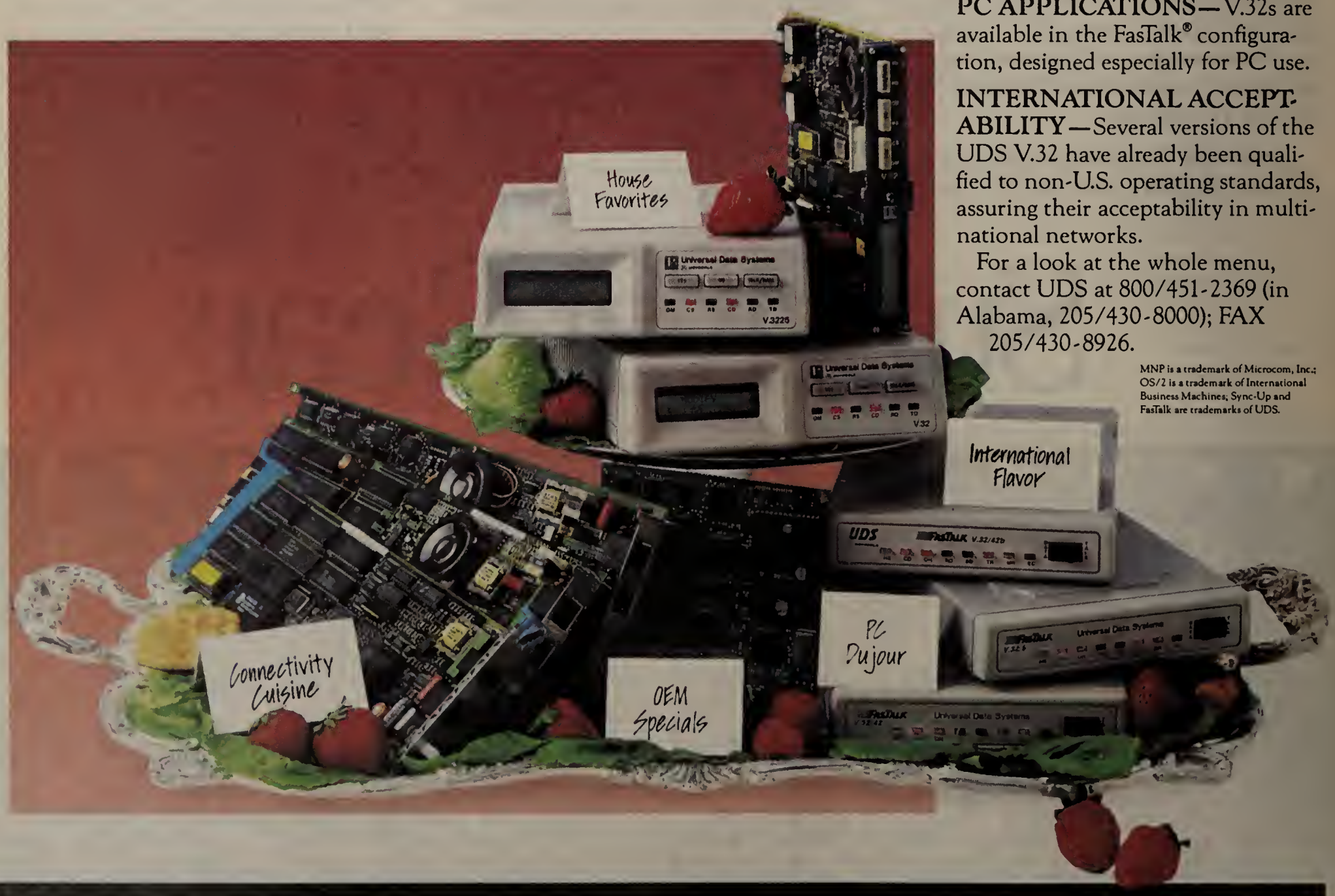
THROUGHPUT—Selected models offer MNP® levels 4 and 5 for error control and data compression; others, in compliance with CCITT V.42 *bis*, offer MNP or LAP-M compression throughput rates up to 38,400 bps.

CONNECTIVITY—Sync-Up™ board-level versions of V.32s are available for various combinations of BSC, SNA and OS/2 host-to-remote communication for EDI, X.25, BSC, SNA and LU6.2 applications.

PC APPLICATIONS—V.32s are available in the FasTalk® configuration, designed especially for PC use.

INTERNATIONAL ACCEPTABILITY—Several versions of the UDS V.32 have already been qualified to non-U.S. operating standards, assuring their acceptability in multinational networks.

For a look at the whole menu, contact UDS at 800/451-2369 (in Alabama, 205/430-8000); FAX 205/430-8926.



MNP is a trademark of Microcom, Inc.; OS/2 is a trademark of International Business Machines; Sync-Up and FasTalk are trademarks of UDS.

UDS
MOTOROLA

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

The worldwide market for mobile data equipment and services totaled $2.7 billion in 1990 and is expected to reach $19.5 billion by 1997, according to a report by Market Intelligence Research Corp. of Mountain View, Calif.

Data Packets

Timeplex, Inc. last week announced new security and network management features for its Timepac X.25 packet switches and the Time/View 2500 network management system.

A Calling Address Validation feature has been added to improve the security of networks based on Timepac X.25 switches. With Calling Address Validation, network addresses of callers to a Timepac switch are checked against a list of valid addresses. Calls from any unlisted address are rejected.

The Time/View 2500 system has been enhanced to include support for Threshold Alarms, which allow users to set reporting thresholds for persistent faults. The feature limits the number of alarms that reach the management console, such as on nets where poor-quality lines can generate numerous error messages.

Newbridge Networks, Inc. last week announced that it has signed on **PacTel Meridian Systems** to market Newbridge digital networking products, including the MainStreet Bandwidth Manager line of T-1 multiplexers.

PacTel Meridian Systems, a partnership of Northern Telecom, Inc. and PacTel Corp., also works as a joint marketing partner with Pacific Bell. The Newbridge deal will make PacTel Meridian Systems a single point of contact for users' line, equipment and maintenance needs.

OSF progresses in search for its DME technology

Establishes technical requirements for standard.

By Paul Desmond
Senior Editor

CAMBRIDGE, Mass. — At recent meetings here and in Munich, Germany, the Open Software Foundation (OSF) passed a milestone in its search for Distributed Management Environment (DME) technology by agreeing to move to the laboratory evaluation phase.

Attendees at the meetings ratified what the OSF called a straw man proposal, which outlines the technical direction in which the DME is headed.

The proposal included the first specific mention of the network management protocols that OSF will be seeking in DME submissions. They include Open Systems Interconnection net management protocols, as well as the Simple Network Management Protocol (SNMP) and remote procedure call (RPC) extensions that address net management.

The meeting also marked completion of the evaluation phase of the DME selection process and the beginning of the selection phase, which includes laboratory evaluation of the proposals.

"The good news is the group ratified the direction we're [taking], so we're on track," said Jonathan Gossels, business area manager for the OSF here and head of the program to select the DME technology. He said the group is on schedule to announce the DME framework this fall.

The OSF issued a request for technology in July 1990 for the DME, which is an architecture and set of applications for network and system management in a multivendor environment.

Of the 27 vendors that responded to the request for technology by last December's deadline, 10 were eliminated before the meeting here earlier this month. Gossels declined to name them.

"None of those 10 had been

(continued on page 16)

Hayes terminal adapter ties systems to BRI lines

By Jim Brown
Senior Editor

ATLANTA — Hayes Microcomputer Products, Inc. last week introduced its first standalone Integrated Services Digital Network terminal adapter that links microcomputers and larger systems to Basic Rate Interface (BRI) lines.

The ISDN System Adapter works with services supported by AT&T 5ESS and Northern Telecom, Inc. DMS-100 central office switches. It will also support the emerging National ISDN-1 standard being developed by the Corporation for Open Systems International (COS) and Bell Communications Research.

Users can link a microcomputer, minicomputer or mainframe to the unit via a single RS-232 or optional V.35 port.

An analog telephone, answering machine or Group III facsimile machine is linked to the unit's RJ-11 port, while an RJ-45 port provides the connection to the BRI circuit.

Users can send asynchronous data to the ISDN System Adapter at up to 38.4K bit/sec or synchronous data at 56K or 64K bit/sec. The ISDN System Adapter ships circuit-switched data over one of two 64K bit/sec BRI B channels.

Alternatively, the unit will transmit X.25 packet-switched data over one B channel and the 16K bit/sec BRI D channel.

Voice or fax traffic is routed over the other 64K bit/sec B channel.

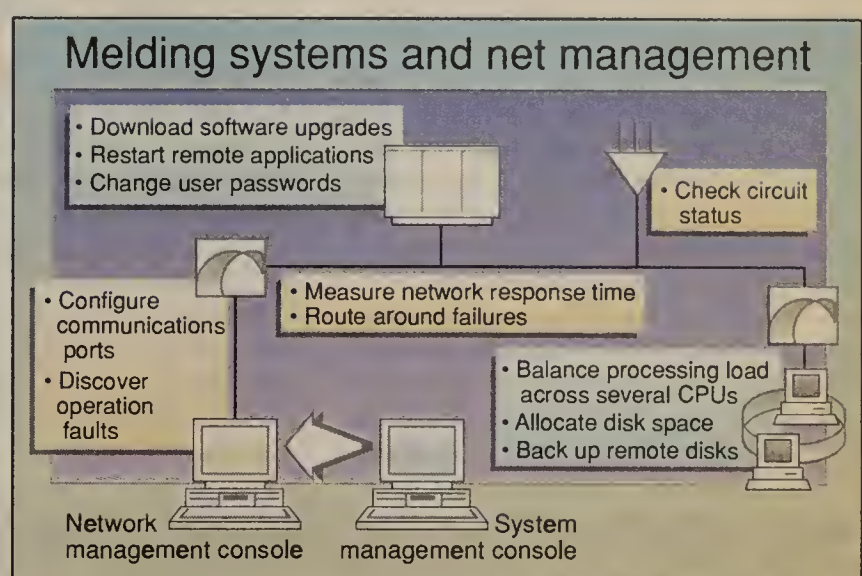
Software support

The product can be used with a variety of communications software, including Hayes' Smartcom Exec and Smartcom III, Excelltech, Inc.'s Excellnet/ISDN, Future Soft Engineering, Inc.'s DynaComm Asynchronous Edition 3.0 and Hilgraeve, Inc.'s HyperAccess/5, as well as Packet/3270 and SNA/3270 X.25 software developed by Telepartner International North America, formerly Packet/PC, Inc.

Seven other vendors also introduced applications that will utilize the ISDN System Adapter as a communications device.

The ISDN System Adapter costs $1,599 and is expected to be available next month.

Until Dec. 31, users may receive the first two units installed at any site for the price of one unit.



Vendors are moving to add remote systems management tasks running on stand-alone, centralized workstations to existing integrated net management systems.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *NETWORK WORLD*

Vendors broadening system mgmt. base

Merging system and net management under one umbrella becomes important for future success.

By Jim Brown
Senior Editor

Major providers of existing integrated network management systems are turning their attention to adding remote computer system management functions to their products.

Digital Equipment Corp., Hewlett-Packard Co., IBM and others are attempting to meld under their own umbrella management systems functions that are currently supported by a mix of stand-alone applications.

AT&T, by contrast, will focus on providing tools to enable users to import information from other vendors' system management tools to its integrated network management system.

Doing so will enable central-site users to monitor and configure remote systems, system resources such as disk drives and printers, and networks of disparate devices from a single console.

These efforts mirror the work vendors undertook to integrate element management systems under the control of a single network management system. Element management systems monitor and control devices such as modems and multiplexers.

"There are a bunch of system management products that exist as stand-alone products, just as network management products stood as stand-alone products," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C. "These stand-alone products will be migrated over to [integrated management systems]."

Adding system management tools to integrated management products will enable users to reach remote systems and download software upgrades, restart remote applications, change user passwords, balance the processing load between systems running the same application and back up remote disks (see graphic, this page).

System management tools will enable users to ensure that systems have enough memory and disk space in order to receive data files.

Integrated management architectures such as IBM's SystemView, DEC's Enterprise Management Architecture (EMA) and HP's OpenView define the infrastructures of common data base, user interface and communications facilities that initially support network management.

"The infrastructure you put in place to manage networks can also manage systems," said Howard Niden, senior manager and director of Price Waterhouse's Great Lakes VAX Consulting Practice in Chicago.

Although IBM is still in the process of defining its SystemView architecture, the vendor has said its host-based NetView network management product will be an integral part of the architecture.

DEC recently announced its Polycenter strategy for merging its existing system management products into its DEC Management Control Center (DECmcc) Director, the core element of EMA. HP has included software to manage remote HP 3000 minicomputers from workstations

(continued on page 16)

Vendors broadening system mgmt. base

continued from page 15

running its OpenView Network Management Server since early 1990.

AT&T has no immediate plans to build system management products directly into its Accumaster Integrator, the core element of its Unified Network Management Architecture. Instead, it will provide links from Accumaster Integrator to standalone system management products.

The first link would be to AT&T Computer Systems' System Manager product, workstation-based software that manages remote Unix System V.4 workstations, as well as AT&T's 3B line of minicomputers and StarGroup hubs.

While each vendor is focusing on adding management support for its own systems, each also realizes the need to manage other vendors' systems.

"At this point, most system management is homogenous," said Duncan Campbell, marketing manager for HP's Colorado Networks Division in Fort Collins, Colo. "The network management folks figured out the need to support multiple vendors' products a little more quickly than system management folks did."

And just as network equipment vendors were quick to provide links from standalone management systems to integrated systems, vendors of system management products are lining up to support integrated system and net management products.

"The age of system management vendors coming out with stand-alone products will fall by the wayside over the next five years," said Robert Yellin, vice-president of technology at Legent Corp. in Vienna, Va. "Legent will support SystemView in the system management products we have for the IBM arena and EMA for those products we supply for the DEC marketplace."

Computer Associates International, Inc. will likewise release SystemView- and EMA-compliant versions of its products, said Kurt Seibert, vice-president of research and development.

Systems Center, Inc.'s Net/Master network management tool, Sys/Master system management tool and Info/Master trouble ticketing tool already share a common IBM host-based user interface and access to host data. However, the firm will migrate its products to support SystemView.

Additionally, Systems Center will examine the feasibility of passing IBM system management data to DECmcc Director or Accumaster Integrator by expanding joint development agreements it has with DEC and AT&T.

As the four vendors embark on merging system and network management under one umbrella, vendor consortia are trying to define a set of standards that will simplify the task.

The Open Software Foundation is defining its Distributed Management Environment, which will specify a common user interface, data base structure and applications to manage remote systems and the network links between them (see "OSF progresses in search for its DME technology," page 15).

The Open Systems Interconnection/Network Management Forum is trying to define a common implementation of the International Standards Organization's emerging Structure of Management Information standard, which defines how systems and system resources can be defined as objects that are displayed on a screen as an icon.

OSF progresses in search for DME

continued from page 15

eliminated because their technology wasn't any good; it was just because it wasn't [the] service we were looking for," he said.

Attendees at the meeting included the OSF's technical evaluation team and its panel of outside consultants, as well as vendors and representatives of standards bodies.

They ratified the OSF's plan to look for DME submissions that support multiple standard net management protocols.

The protocols include OSI Common Management Information Protocol/Common Management Information Services (CMIP/CMIS), SNMP and RPC.

The OSF said those protocols should not be bound to any particular transport protocols. This means, for example, CMIP could be used over a Transmission Control Protocol/Internet Protocol network.

"The last thing we want to do is get mixed up in religious wars over which management protocol is best," Gossels said. "The fact is there are devices out there that use all of them, and our solution has to support those."

RPCs are not network management protocols per se, but Gossels said the RPC's interface definition language — which defines what the procedure call is going to do — will be extended to include management services.

The OSF has already defined an RPC in its Distributed Computing Environment. Extending that RPC to include management services would give users an efficient way to send management data around the network, he said.

Gossels said the OSF also defined a set of application program interfaces (API) that the DME should support, including an API between the managed objects and the management services to be provided. That API should support the CMIS management functions as well.

We Heard You

Introducing a heavenly way to free yourself from earthly bonds to move LAN networks just about anywhere. Anytime.

With California Microwave's new wireless *RadioLink* LAN,[tm] you can move your networks as easily as you, yourself. Interference free.

Floors, ceilings, walls, concrete, brick, glass . . . even metal filing cabinets are totally transparent. Also, you don't have to worry about "hidden" nodes. Using advanced microwave technology, this wireless LAN will find and communicate with every single computer on your net.

But reliability is only part of the story. *RadioLink* is designed to work flawlessly with multiple subnetworks, simultaneously. That means dramatically increased network data throughput.

For the total story on this new worry-free, wireless LAN by the microwave communications professionals, please call our *RadioLink* Hotline.

1-800-772-LINK (5465)

California Microwave, Inc.
985 Almanor Avenue
Sunnyvale, CA 94086
TEL: (408) 732-4000
FAX: (408) 732-4244

CALIFORNIA MICROWAVE

This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained. *RadioLink* is a trademark of California Microwave.

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

"In the August/September time frame, we'll map out the next two years' strategy for Timeplex. The focus will be on LAN-WAN interconnection and on integrating those two markets from a network management perspective."

James Babcock
Vice-president of product management
Timeplex, Inc.
Woodcliff Lake, N.J.

Netnotes

Ungermann-Bass, Inc. has landed a contract to install a 4,000-node local-area network at GTE Telephone Operations headquarters in Irving, Texas. The network will consist of 56 Access/One smart hubs, a fiber-optic backbone and unshielded twisted-pair cabling to desktop systems. The network will be managed using Ungermann-Bass' Net-Director. GTE resells Ungermann-Bass products.

Comdisco, Inc. recently announced that its Block Oriented Network Simulator (BONeS) net design and analysis tool can now generate traffic using actual data from Hewlett-Packard Co.'s LANProbe monitoring product.

According to Comdisco, based in Foster City, Calif., the new interface software packaged with BONeS automatically converts real network data collected with HP's LANProbe into a file that can be read by Comdisco's BONeS traffic generator. An administrator can analyze an existing configuration or devise an alternate configuration and use the LANProbe data to drive the simulation, Comdisco said.

BONeS is available for Sun Microsystems, Inc. Sun-3 and Sun-4 workstations, as well as Digital Equipment Corp. 2100/3100 DECstation workstations, for $20,000.

Timeplex bridge/router bolsters internetwork line

Concentrator, mgmt. software also enhanced.

By Caryn Gillooly
Senior Editor

WOODCLIFF LAKE, N.J. — Timeplex, Inc. recently unveiled a bridge/router and enhancements for its current concentrator and network management products, additions that vastly increase the scope of the company's line of internetworking products.

Headquartered here, Timeplex branched out of its mainstay multiplexer business into local-area networks last year with the introduction of Ethernet and token-ring bridges and routers.

The new multiprotocol Time/LAN 100 Router*Bridge can route Transmission Control Protocol/Internet Protocol, Xerox Corp.'s Xerox Network Systems and Novell, Inc.'s Internetwork Packet Exchange (IPX) traffic over Ethernet, token-ring and Fiber Distributed Data Interface networks, according to James Babcock, Timeplex's vice-president of product management. Previously, the company only offered a TCP/IP router.

Babcock said Timeplex plans to support Digital Equipment Corp.'s DECnet and the Open Systems Interconnection protocol stack, but he declined to say when.

Standards support includes a Simple Network Management Protocol (SNMP) agent in the bridge/router, which enables it to be managed by Timeplex's and other vendors' SNMP management systems. Also supported are TCP/IP's Point-to-Point Protocol (PPP) and Open Shortest Path First (OSPF) routing protocols.

PPP specifies a standard format for sending information from router to router, enabling customers to mix and match different vendors' routers without having to worry about proprietary technologies.

OSPF is the dynamic routing protocol specified with TCP/IP that lets administrators determine how data is transmitted through an internetwork: over the path with the least hops, over the least expensive path or over the shortest path.

Before OSPF, TCP/IP specified the use of the Routing Information Protocol, through which

(continued on page 19)

DCA's newest version of 10NET rivals NetWare 286

By Caryn Gillooly
Senior Editor

ALPHARETTA, Ga. — Digital Communications Associates, Inc. recently unveiled a new version of its peer-to-peer local-area network operating system that users say rivals the performance of Novell, Inc.'s NetWare 286.

The new version, 10NET Plus Version 4.20.20, has four major enhancements: it is easier to install; is compatible with IBM's LAN Server and Microsoft Corp.'s LAN Manager NETBIOS Extended User Interface (NETBEUI) protocols; complies with the 3Com Corp./Microsoft Network Driver Interface Specification (NDIS); and has significant memory and performance enhancements.

The latter enhancements are perhaps the most important.

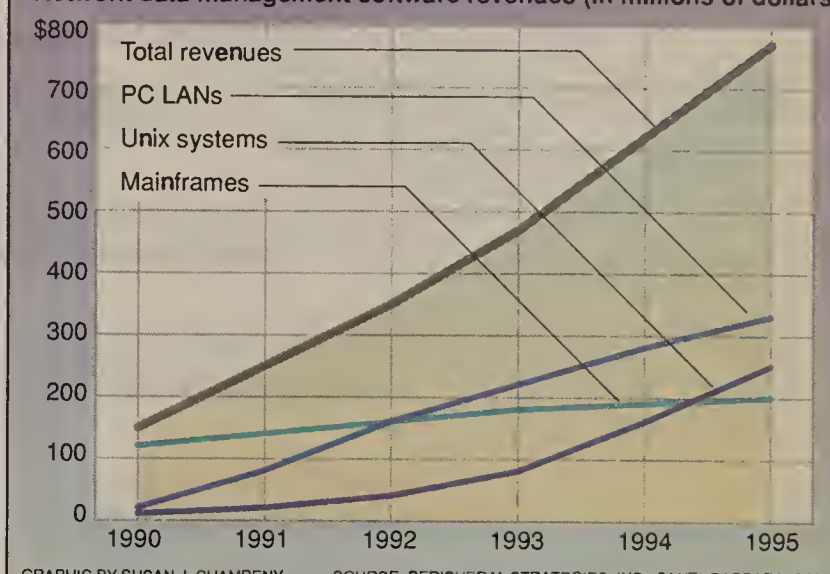
According to Guy Powell, vice-president of marketing at DCA, based here, the new version includes a high-performance option that enables administrators to establish a disk cache on a server in order to store frequently used commands. That improves net performance by saving the operating system from having to search randomly through the disk to find the commands.

Rick Hopkin, president of Vast, Inc., a consulting and systems integration firm in Columbus, Ohio, that beta-tested 10NET 4.20.20 for about two months, said the previous version of the operating system would take between 85 and 92 seconds to transfer a 5M-byte file. The new version, he said, can transfer the same file in 32 seconds or less.

Allyn Conway, president of ACG, Inc. Computer Business Systems, a consulting company in Dayton, Ohio, that has been beta-testing the product for about six weeks, said, "We had [performance] problems with 10NET and [Microsoft] Windows in the previous version, but now we use it to run things from accounting packages to Windows and [Aldus Corp.'s] PageMaker — which can have 800K-byte files — and they come across the network just fine."

(continued on page 19)

Bright future predicted for data management



GRAPHIC BY SUSAN J. CHAMPENY SOURCE: PERIPHERAL STRATEGIES, INC., SANTA BARBARA, CALIF.

Connectivity cause of data mgmt. woes

Report finds users grappling with lack of tools to handle increasing data volume as nets grow.

By Eric Smalley
Senior Editor

SANTA BARBARA, Calif. — Special software for managing data stored on devices scattered across networks will represent an $811 million market by 1995, a nearly fivefold increase over 1990 sales, according to a report by Peripheral Strategies, Inc.

The explosion in connectivity of workstations to local-area networks and LANs to enterprise networks is resulting in the rapid expansion of data on corporate networks. "We are racing toward a data management crisis," said Michael Peterson, president of Peripheral Strategies, a market research firm here.

In 1990, the average amount of data that had to be backed up on each personal computer network was 590M bytes. This year, the amount will be more than 1G byte, and by 1995, the amount will be 4.7G bytes, according to the report. The amount is determined by adding the capacity of the servers on the network plus 10% of the capacity of the personal computers.

Growth in the amount of data requiring backup on Unix workstation networks is expected to be equally dramatic. In 1990, the amount was just under 2G bytes. This year, the amount will be 2.7G bytes, and by 1995, the amount will be 7.5G bytes, according to the report.

The problem is that LANs and even Unix workstation networks have lacked the tools common to the mainframe environment for handling large amounts of data. Those tools are just now becoming available for networks as a result of user pressure on vendors to address data management.

The base-level tools for personal computer LANs are storage devices such as high-capacity tape drives that can be used to back up the hard disks of individual file servers. These are referred to as "network-aware" backup devices by the report because unlike basic tape drives, they can back up and restore the network operating system as well as files.

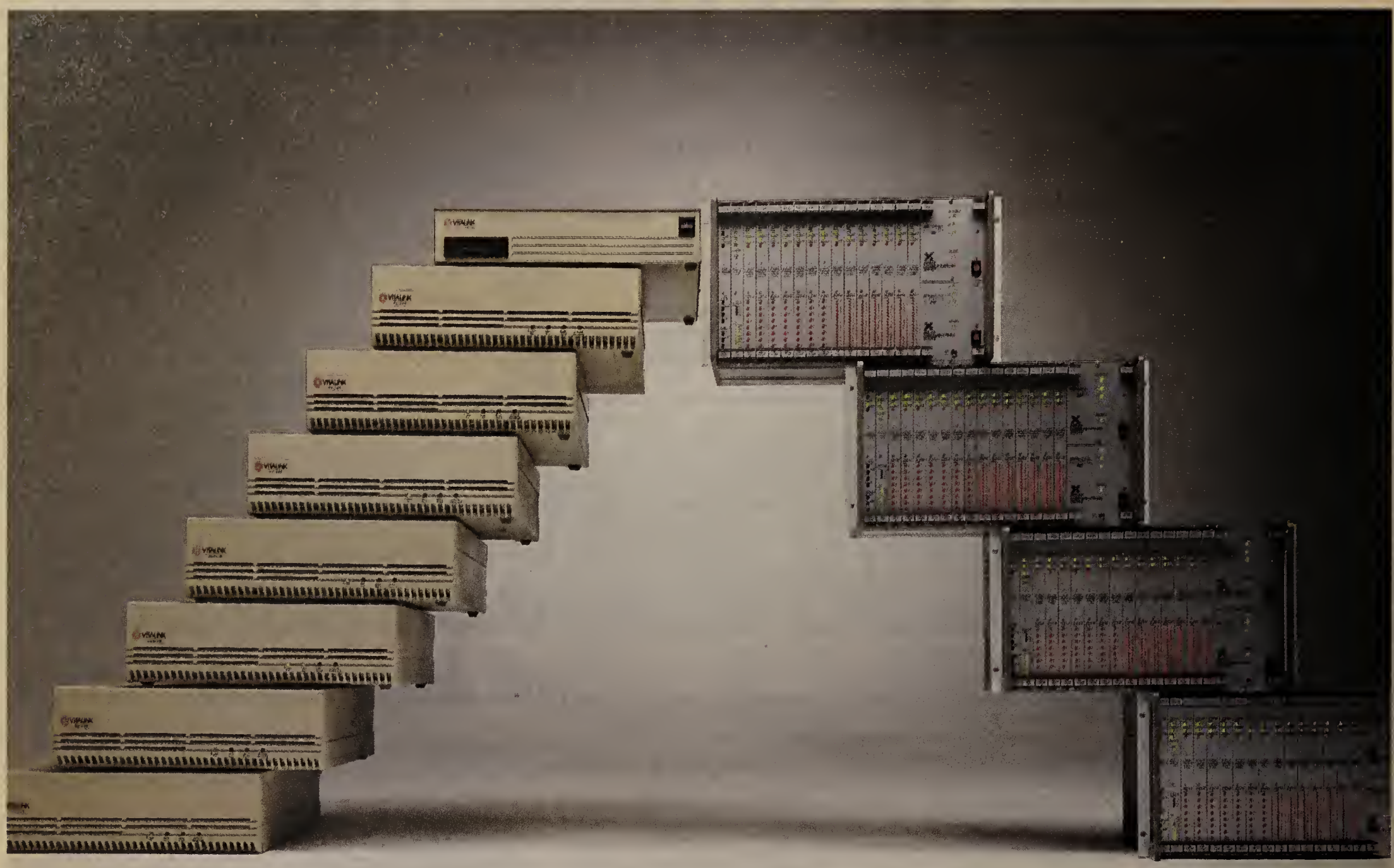
"We are racing toward a data management crisis," Peterson said.

▲▲▲

Next-generation tools, called LAN data management software, are just now becoming available and enable the backup and restoration of files for multiple network servers and clients. Data management software also includes features such as the ability to migrate infrequently used files to archival storage and a data base for automating the restoration of files.

The number of software licenses for the basic personal computer LAN backup products shipped in 1990 was 273,600, a figure that is expected to grow to 426,000 this year. The number of data management software li-

(continued on page 19)



HERE'S A BRIDGE SOLUTION THAT BEGINS WHERE OTHERS LEAVE OFF.

Who says remote bridges from different vendors can't interoperate? They can!

Because now there's the MAXserver® 6510 remote bridge from Xyplex that's completely compatible with any Vitalink bridge or bridge/router. Furthermore, only the MAXserver LANBUS™ can be configured to act as its own remote LAN, eliminating the need to install and maintain a costly Ethernet segment at the remote site. Simply plug the 6510 card into any MAXserver LANBUS chassis and you economically connect remote users or satellite offices to a corporate Ethernet backbone.

And you can choose the WAN-link configuration that's best for you. For example, link two 6510 cards together over your WAN with IPO,™ Xyplex's solution for enhanced handling of time sensitive, interactive protocols such as LAT. Or link to a Vitalink TransLAN bridge or TransPATH bridge/router using Vitalink's Communication Protocol. The MAXserver 6510 delivers complete interoperability, high performance, and unmatched flexibility.

But that's not all. You can monitor and configure the 6510 with Vitalink's WANmanager, any SNMP management system, or local and remote console support from Xyplex. Furthermore, the 6510 supports a broad range of transmission speeds and physical interfaces as well as providing protocol transparency, IEEE spanning tree support, remote software loading and a three year warranty.

So if you've been looking for a high function, cost-effective bridge solution, contact us for complete details about the 6510.

We're certain it's the one bridge you'll want to cross when you come to it.

For more information call

1-800-338-5316

Or write, Xyplex, Inc., 330 Codman Hill Road, Boxborough, MA 01719

Name _____

Title _____

Company Name _____

Address _____

City _____ State _____ Zip _____

BRNW2

XYPLEX

DCA's new 10NET rivals NetWare 286

continued from page 17

Both suggested that 10NET Plus Version 4.20.20 offers comparable performance to Novell's NetWare 286 environment for a much more reasonable price.

But 10NET 4.20.20 has the advantage of being able to run in a peer-to-peer fashion in which workstations are not reliant on a shared server. Thus, a server failure will not totally cripple the network, Hopkin said.

"With Novell, you've got a server, and if the server goes down, the network is down," Hopkin said. "With 10NET, if the server goes down, you can go to any other [personal computer] and designate that as the server" or run the net as peer-to-peer.

More enhancements

Other enhancements include the operating system's new installation program for MS-DOS and Windows, according to DCA.

10NET 4.20.20 virtually walks the administrator through the process by asking questions such as whether LAN resources will be shared.

"You can get this up and running in less than 2½ hours," Conway said. "With Novell's [NetWare 286], it took more like 1½ days. That's important to our customers."

Support of NETBEUI is another important enhancement, according to DCA's Powell. The new operating system release contains 10NET's 10BEUI protocol stack, which is compatible with NETBEUI. NETBEUI is the packet-forwarding protocol used in LAN Manager and LAN Server, which is akin to Novell's Internetwork Packet Exchange (IPX).

Powell also highlighted the NDIS support; NDIS is a generic device driver for network interface cards from different vendors. This means customers can now implement DCA's operating system and drivers on their existing hardware.

DCA's 10NET Plus Version 4.20.20 is available now. A base package costs $129; license kits to support three, five, 10 and 20 users range in price from $299 to $1,379 per kit.

Bridge/router bolsters internet line

continued from page 17

information would be routed only over the path with the least number of hops.

OSPF is also more efficient and uses up less bandwidth by broadcasting only routing table updates to other routers, as opposed to resending entire routing tables whenever a network change is made.

The bridge/router is based on a motherboard that can accommodate three network interface daughterboards. The company's Ethernet daughterboards offer four ports per board, while its token-ring and FDDI connections have only one port.

Timeplex also released the enhanced Time/LAN 100 FDDI Concentrator*32, which has SNMP support and 32 ports. The older product offered only eight ports.

The focus of the concentrator upgrade, however, is to bring FDDI down to an affordable level. "We're looking to reduce the cost per connection for FDDI," Babcock said. "The list price for this [concentrator] puts the cost at less than $2,300 per port." Previously, the per-port cost was as much as $4,500.

Lastly, the company announced an enhanced version of its Time/LAN 100 Element Management System. The new version is virtually identical to the previous version except that it offers support for SNMP Management Information Base (MIB)-II. MIB-II is the latest release of the SNMP data base of net management objects that can be managed through SNMP.

The Time/LAN 100 Router*Bridge costs between $7,995 and $26,800, depending on configuration, and the Time/LAN 100 FDDI Concentrator*32 ranges in price from $24,700 to $73,200. Both are expected to be available in June. The Time/LAN 100 Element Management System is available now for $10,000 to $16,000, depending on configuration.

Connectivity cause of data mgmt. woes

continued from page 17

censes shipped in 1990 was 32,400 and is expected to grow to 187,900 this year, according to the report.

By 1995, backup software licenses for LANs will number only 174,000, while data management software licenses will number 783,000, the report stated.

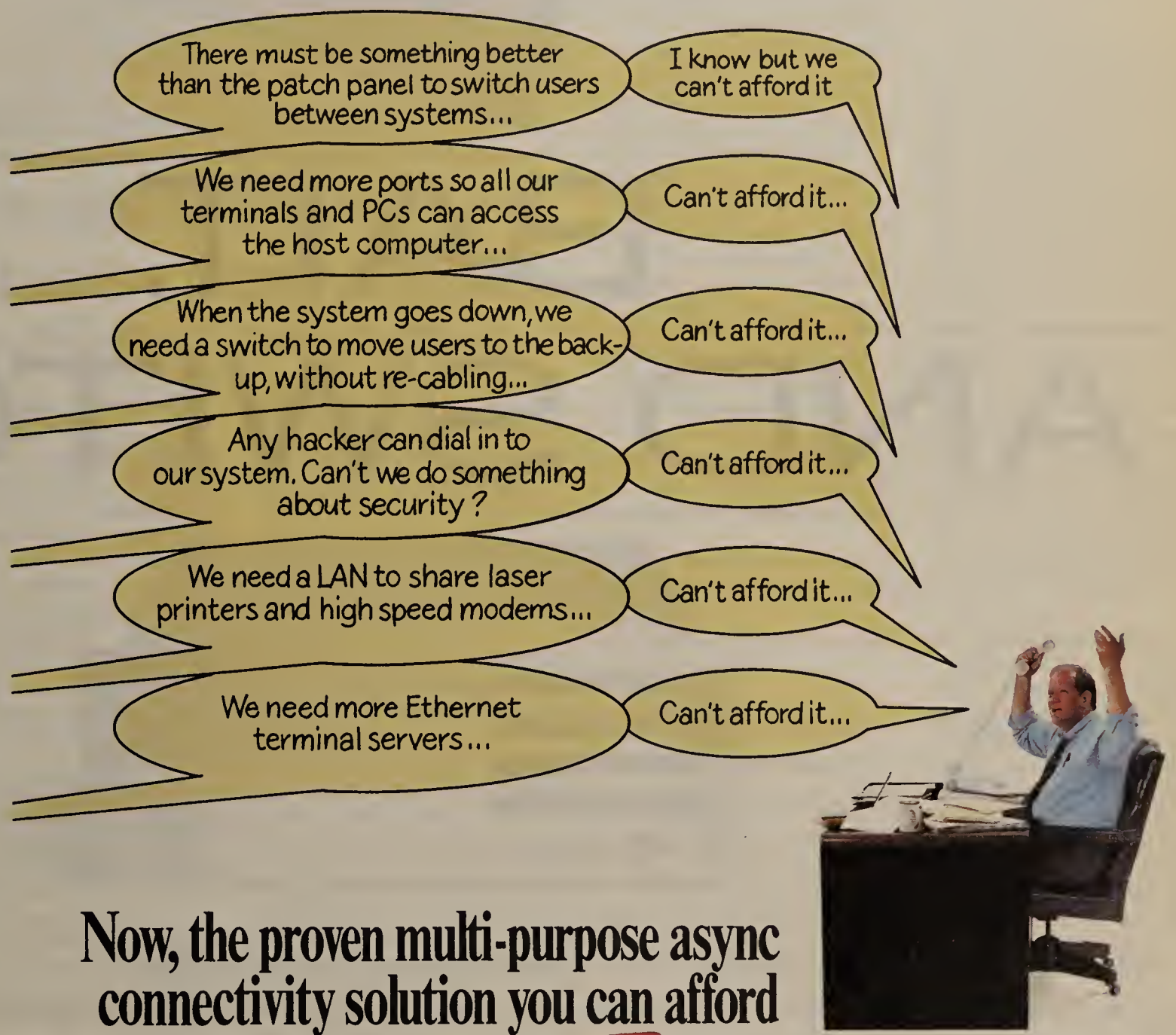
In the Unix workstation network environment, the Peripheral Strategies study identifies two classes of data management software: backup applications and storage server software.

Backup applications are equivalent in function to data management software products for personal computer LANs. "The next step is the storage server, which is a distributed system running in the background," Peterson said.

Storage servers, which have not arrived yet for microcomputer LANs, combine data management software with a dedicated system comprising a processor, hard disk storage and archival storage.

The number of backup applications for Unix workstation networks shipped in 1990 was 6,700. The number of storage server software licenses shipped in 1990 totaled 300.

By 1995, backup applications will number 60,000 while storage server software licenses will number 36,900, according to the report.



Now, the proven multi-purpose async connectivity solution you can afford

With Equinox, you **can** afford to network all your asynchronous terminals and PCs to your host computers — even when times are tough. Switch between hosts from your keyboard. Establish multiple sessions with a few keystrokes. Share ports among part-time users. Let users access printers and share modems. Even transfer files among PCs without installing a LAN.

Twisted-pair cabling keeps installation costs low and eases people and equipment moves. T1, Ethernet, RS-232, RS-423 and current loop interface options simplify connections in multi-vendor environments, cross-campus or cross-country. Built-in fault tolerance keeps you operational, and the system is supported by a full three year warranty.

Whether you have fewer than 100 or thousands of users, Equinox has a Data PBX sized to fit your needs. And at about $100 per port, it's the networking solution you can afford! Call today for details of our 30-day free trial.

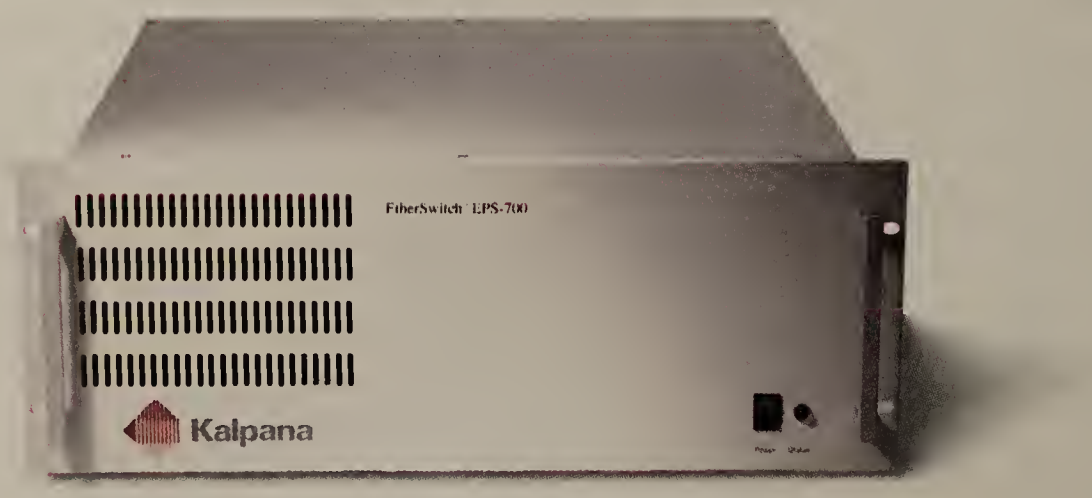
EQUINOX

Equinox Systems, Inc.
14260 S.W. 119 Avenue
Miami, FL 33186

800/275-3500

BAIT.

AND SWITCH.



If the thought of boosting your Ethernet LAN throughput 300% is alluring, take a close look at EtherSwitch™ from Kalpana. Through our innovative Ethernet switching technology, EtherSwitch gives you an immediate, affordable new alternative that actually increases your LAN throughput to 30 Mbit/s. All without the reconfiguration problems and traffic delays of bridges and routers. Or without the high cost of installing FDDI. You simply plug EtherSwitch into your existing network. And, as with a telephone PBX, instead of a single stream of data being sent one packet at a time, you get simultaneous transmission of multiple packets through the EtherSwitch. Through our ability to filter and forward 100% of all traffic and move an infinite stream of back-to-back packets without the loss of a single packet, you're assured of the high performance needed for demanding file server and network applications. All of which adds up to *true Parallel Networking*. With EtherSwitch you add new life and longevity to your network. You also protect hardware and software investments. Because EtherSwitch is transparent to all high-level protocols and compatible with IEEE 802.3 standards. Plus you'll prepare for the future. As network demands increase, just plug another EtherSwitch into your LAN. It's that simple. So if your Ethernet LAN continues to be slowed down by more data than it can handle, call Kalpana — the first name in Parallel Networking. With 300% more throughput, we're committed to getting you off the hook. 800-488-0775, extension #10.

Kalpana

The Parallel Networking Company

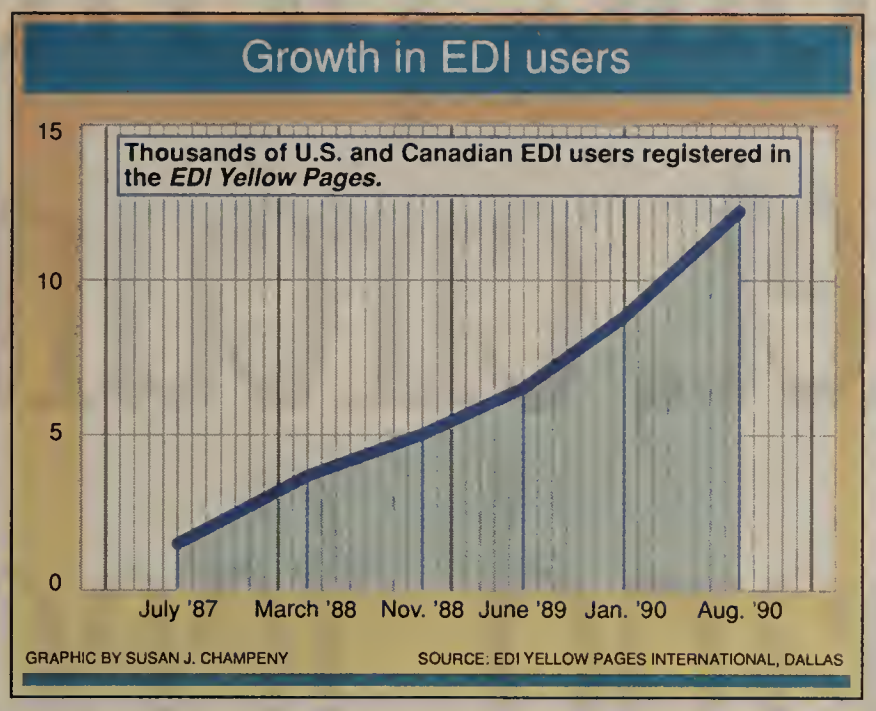
125 Nicholson Lane, San Jose, CA 95134 (408) 428-1150

EtherSwitch is a trademark of Kalpana Inc.

Worth Noting

"Many network security features are so badly designed as to invite tampering and careless mistakes by end users."

Robert Courtney
President
RCI
Port Ewen, N.Y.



Association Watch

International economist Murray Weidenbaum will address tactical planning in an uncertain economy at the **International Communications Association's (ICA)** 44th Annual Conference and Exposition from June 2 to 7 in Anaheim, Calif.

Weidenbaum, who specializes in business, government and academia, is a former U.S. chairman of the Council of Economic Advisers.

Other featured speakers include James Robinson III, chief executive officer at American Express Co., who will discuss the strategic importance of corporate telecommunications.

William Johnson Jr., vice-president of telecommunications and networks at Digital Equipment Corp., will discuss leadership in the changing global business environment.

For more information, call (214) 716-4143.

John Eger, a professor of communications at San Diego State University, has been elected chief executive officer and president of the **San Diego Communications Council.**

The council, which comprises senior communications executives, brings together individuals from cable, broadcast, print, telephone and data transmission, education, and high-tech manufacturing to discuss communications-related issues.

Eger served Presidents Nixon and Ford as an advisor and director of the White House Office of Telecommunications Policy.

Firm consolidates but keeps customers happy with EDI

Electronic links make up for closure of branches.

By Maureen Molloy
Staff Writer

BENTON HARBOR, Mich. — Whirpool Financial Corp. (WFC) has launched an electronic data interchange implementation program intended to establish EDI links with 100 of the company's largest trading partners within the next two years.

The project took shape two years ago after WFC consolidated 46 nationwide sites into five regional offices. EDI was seen as a way to provide clients with the speedy service they were accustomed to getting from local offices while letting WFC centralize the processing of such items as accounts receivables and invoices at its headquarters here.

"The move to centralized processing resulted in significant cost savings to us, but we needed to do something to keep our clients happy, too," said Mark Perfitt, WFC's EDI project manager.

WFC, a subsidiary of Whirlpool Corp., provides financial services to manufacturers, distributors and consumers in Canada and the U.S.

Perfitt said EDI will allow trading partners to send and receive documents from WFC on a daily basis, simulating the contact they were accustomed to when they could carry invoices and accounts receivable to local branch offices, many of which were in the same building as the client.

Another benefit of adopting EDI is the savings for both WFC and its trading partners. The cost to process a paper invoice, for example, averages $2.75, while an EDI invoice costs 26 cents.

Each trading partner is provided with personal computer software to translate EDI messages into ANSI X12 and a mailbox on BT North America, Inc.'s packet-switched network. Documents are collected daily and then sent to a Whirlpool Compaq DeskPro personal computer used as a front end to a mainframe at headquarters. The DeskPro translates messages delivered in ANSI X12 to WFC's EDI application.

WFC is easing the implementation process by assuming all of the hardware, software and network installation costs.

Perfitt has concentrated on incorporating the largest 100 suppliers, which comprise 80% of WFC's business, into the program first but will add others incrementally. WFC's 50 largest clients are already trading nearly 500,000 documents a year electronically. The next 50 should be EDI-ready by mid-1992.

In an effort to make the EDI strategy as successful as possible, WFC management chose businesspeople over technical staff to promote the service to trading partners. Perfitt said it has helped that WFC's EDI team comprises a single technical person and three workers plucked from each of the company's business units.

"The aim was to extol the business benefits of doing EDI with our trading partners," he said. "The premise was that the technical side of EDI was less important and the businesspeople could be taught the technical issues."

"There's a real perception by top management in many companies, whether it's valid or not, that they can't communicate well with the technical side of the house," he added. "So when we go in to each client, we talk strictly about the business advantages of doing EDI."

Networking key to surviving rail strike

EDI, satellite tracking systems would have helped manufacturers and their suppliers track materials.

By Wayne Eckerson
Senior Editor

Although a recent one-day railroad strike threatened to hobble U.S. industry, some companies said their use of EDI, satellite tracking systems and other net technologies would have helped them weather — or even capitalize on — the work stoppage.

Although many companies stockpiled inventory and made arrangements to move materials by truck or other modes of transportation, most observers agreed that a strike lasting a week or more would have resulted in massive plant closings and layoffs.

The hardest hit would have been manufacturers that rely heavily on rail carriers to deliver raw materials and finished goods, and those that use just-in-time methods, most notably the automakers.

While the economic impact of a prolonged strike would have been great, manufacturers said electronic data interchange and satellite-based mobile tracking systems would have been invaluable in helping them coordinate backup modes of transportation to replace stocks stranded in railcars.

"Without EDI, it would have taken a monumental effort and a lot of phone calls to identify exactly where all our raw materials were."

▲▲▲

Suppliers said EDI would have helped them keep their production cycles in sync with manufacturers as plants scaled back their orders in response to the strike.

Truckers make out

On the other side of the fence, electronic tracking systems would have helped trucking companies maximize their profits from the strike by enabling them to rapidly redeploy their fleet to handle shipments for companies that usually rely on rail carriers. Those carriers said EDI and other forms of electronic communication would have made it easier to continue operations using supervisors to run the railroad.

Vulnerability

Ironically, the use of just-in-time technology, which is often based on EDI, may have made industrial companies more vulnerable to disruptions in transportation. With just-in-time, companies minimize inventories by having parts delivered as needed on the assembly line. EDI facilitates just-in-time delivery by making it possible to transmit orders and shipping schedules to suppliers quickly and precisely.

Minimizing inventories saves manufacturers money but also makes them vulnerable if the flow of materials is disrupted. "When we went with [just-in-time] years ago, we knew [transportation disruptions] would be a risk," said one manufacturing manager who requested anonymity.

Car-locator messages

ICI Americas, Inc., an international producer of chemical-based products, uses an EDI message called "a car-locator transaction set" to track rail shipments of raw materials such as chemicals used in making detergents and insecticides. In the case of a rail strike, ICI Americas would have known immediately how much inventory was stuck on railcars so it would have known how much stock to have delivered by truckers.

"Without EDI, it would have taken a monumental effort and a lot of phone calls to identify exactly where all our raw materials were," said David Gicker, manager of information systems at the Wilmington, Del., company.

EDI can also expedite the process of finding an available trucker or other carrier to ship goods, according to Doug Anderson, director of technical services at the American Trucking Association in Alexandria, Va.

Instead of making countless phone calls to carriers, companies can send an EDI message known as "a load tender transaction" to a list of carriers that are EDI trading partners. The message asks those carriers whether they are available to transport truckloads of freight between two locations on a given date.

"EDI allows shippers to query

(continued on page 54)

The public, private, packet, circuit, broadband, feeder, local, global, so you can sleep at night network company.

Find out how you can get more of everything you need from your network – from access to applications – including peace of mind.

Call N.E.T. and we'll send you a free copy of "Architecture for the World's Most Demanding Networks" so you can sleep at night. Call 1-800-952-6300, ask for dept. N1C.

Architecture for the world's most demanding networks.™

N.E.T. NETWORK EQUIPMENT TECHNOLOGIES™

©1991, Network Equipment Technologies, Inc., 800 Saginaw Drive, Redwood City, CA 94063. (415) 366-4400. TLX 172325. United Kingdom: Network Equipment Technologies, Ltd, Manor Court, Manor Royal, Crawley, West Sussex, RH102PY England, (+44) 293-612648. France: Network Equipment Technologies S.A., ZAC Paris Nord II, 7 Rue du Canal, P.P. 40041, 95912 Roissy CDG Cedex, France, (+33) 1 48 63 76 84. N.E.T., Network Equipment Technologies, Architecture for the world's most demanding networks, and the N.E.T. logo are trademarks of Network Equipment Technologies, Inc.

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

US Sprint Communications Co. recently said it is working with British Waterways, a U.K. shipping concern, to study the feasibility of building an alternative fiber-optic network along the firm's canal and river rights of way.

GPT, Ltd., a major U.K. telecommunications equipment manufacturer, is also participating in the study.

The alternative network would take advantage of major regulatory changes now being implemented in the U.K. to end the duopoly policy of only allowing full network competition between British Telecommunications PLC and Mercury Communications, Ltd.

According to US Sprint, the alternative carrier would use its fiber-optic network to sell high-capacity communications channels to established telecommunications companies, resellers and users.

Satellite Technology Management, Inc., a satellite equipment maker in Costa Mesa, Calif., recently said it received an order worth more than $1.5 million to supply Organizacion Editorial Mexicana with a very small aperture terminal satellite network linking the publishing firm's Mexico City headquarters to 32 remote sites throughout Mexico.

Organizacion Editorial Mexicana publishes 68 newspapers, including *El Sol* and *Esto,* the largest dailies in Mexico City. The VSAT network will be used to transmit stories and photographs.

Profile of a global net revolution

Continental Grain's plummeting international circuit costs

Date	Private line for New York-to-Geneva link	Traffic supported	Cost
1970s to early 1980s	Analog circuit	1 voice or data channel	$16,000 monthly
1987	Digital 56K bit/sec satellite circuit	2 16K bit/sec voice and 2 9.6K data channels	$11,000 monthly, or $2,750 per communications channel
1991	Digital 128K bit/sec fiber-optic circuit	10 8K bit/sec voice, 2 9.6K bit/sec fax and 2 19.2K bit/sec data channels*	$14,000 monthly, or $1,000 per communications channel

*Use of fax reduces the number of voice channels available.

Continental Grain, a privately held, $13 billion commodities trading company, is installing a new European network in order to cut international expenses.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: CONTINENTAL GRAIN CO., NEW YORK

Oracle scours int'l service bill and unearths surprise

Satellite propagation delays result in hefty charges.

By Barton Crockett
Senior Editor

REDWOOD SHORES, Calif. — Even when an international carrier's service seems to be working fine, it can pay to scrutinize global network bills.

That's what Oracle Corp.'s networking staff learned late last year when staffers noticed that expenditures on international value-added network services from Infonet Services Corp. were far higher than expected.

Oracle uses Infonet's international X.25 network to carry Transmission Control Protocol/Internet Protocol traffic from multiple Unix processors in Hong Kong, New Zealand and Singapore to Sydney, Australia, and over a 64K bit/sec satellite circuit to Oracle headquarters here.

Staffers noticed that the thousands of dollars Oracle was spending per month on Infonet services were much more than expected for the low-volume, electronic mail application the company was running.

"It was one of those things where we said, this looks a little strange; why don't we look into it," explained Jack Haverty, internet architect for Oracle's network products division, which runs Oracle's internal network.

Delay of 2.5 seconds

Haverty said Oracle staffers found, to their surprise, that a processor in New Zealand was transmitting data packets about 2½ times on average. This was because the combined 2.5 second delay on Infonet's net and the satellite hop just barely exceeded host timing parameters. This meant that transmissions were working, but Oracle was, in essence, paying to send its data twice.

Haverty said the experience illustrates the importance of checking out how well communications systems respond to often adverse international network conditions.

U.S. users pan global videoconferencing

Firms cite lack of circuits, long reservation times for overseas lines as drawbacks to int'l video nets.

By Maureen Molloy
Staff Writer

While many users have praised technological gains in videoconferencing over the past five years, some say foreign carriers must make a number of improvements for their services to be practical in the international arena.

Users with international nets cite a lack of terrestrial and satellite links to some nations and a general dearth of high-speed digital circuits in many countries as the major drawbacks to implementing international videoconferencing networks. They also listed the long lead times required to reserve international circuits for videoconferencing sessions as another potential drawback.

"The rule of thumb is that the greater the distance, the greater the value of videoconferencing, but the fact today is that it's much easier to do videoconferencing domestically than internationally," said John Champa, manager and chief engineer of videoconferencing at Unisys Corp.

Champa, who helps Unisys videoconference daily from headquarters in Blue Bell, Pa., and five other U.S. sites to two regional offices in the U.K., said the price of videoconferencing hardware has plunged during the past few years while picture quality has significantly increased. The problem is a lack of adequate international links.

"[Coder/decoders] today are getting better and better, and the quality of compression and video imaging have gone up, so we can now get comparable or even better videoconferencing at 384K bit/sec than we were getting previously with a 768K bit/sec circuit," Champa said. "But finding 384K bit/sec bandwidth internationally — not to mention 128K bit/sec — is difficult."

Dell Fischer, corporate telecommunications manager at Hewlett-Packard Co., agreed. HP, which has six international videoconferencing rooms, holds between 30 and 50 videoconferencing sessions each week with HP research and development sites in Europe and Hong Kong.

"The biggest challenge is getting connectivity with all the countries we'd like to have it with," he said. "The infrastructure in many foreign countries just isn't capable of supporting reliable high-speed digital circuits."

Another challenge is the long lead time to reserve a videoconferencing session in countries other than the U.K. and Europe, users noted.

Larry Ehlers, manager of telecommunications at aerospace parts manufacturer Bendix/King, said his company has been holding weekly videoconferencing meetings with a Singapore manufacturing affiliate for three years. These meetings with colleagues in the Far East typically must be scheduled two weeks in advance to obtain a circuit.

Setting up a conference between domestic sites takes about 10 minutes. A conference to the U.K. or Europe typically requires a two-day lead time, while one to the Far East can take two weeks.

"It's an archaic system to gain

(continued on page 55)

What it takes to be the international specialist. #3 in a series.

"Take on the tough circuits."

—Al Prekeris, V.P., Engineering World Communications, Inc.

Part of being a top international carrier is taking on the jobs other carriers can't—or won't—handle.

We've performed our share of small miracles at WorldCom. Like not just serving as international carrier for a European company, but reconfiguring their network as many as two times a week as their changing needs dictate, and obtaining type approval for special equipment.

WorldCom can also take you to places where others fear to tread. Our knowledge of (and relationship with) PTTs and other agencies in developing countries enables us to get you circuits others might not get so easily. We'll also train your personnel to operate your network properly.

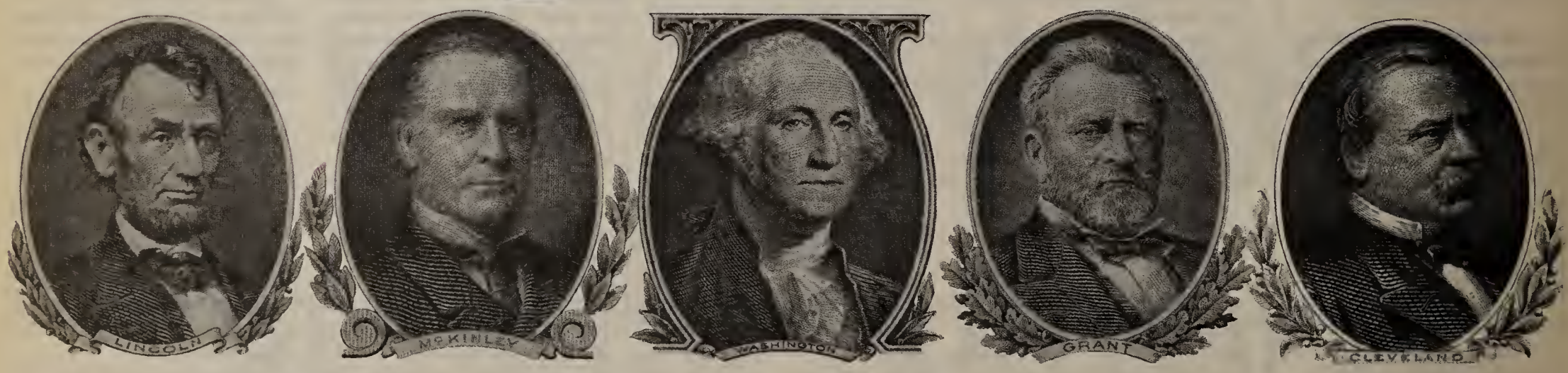
Finally, we'll take on the tough job of managing your network at the distant end—saving you the costs of staffing it yourself. It's the kind of responsibility other carriers shy away from—and we actually look for.

At WorldCom, it's my job to help our engineers rise to *your* international network challenge. Put us to the test. Call 800-733-3755, FAX: 212-607-2274.

WorldCom

THE INTERNATIONAL TELECOMMUNICATIONS SPECIALISTS • A TELE COLUMBUS COMPANY

If we can't convince you to try *AT&T MEGACOM*® *WATS*, maybe these guys can.



Your savings on *AT&T MEGACOM WATS* outbound long distance service can really add up.

Sign up before September 2, 1991 and you can get $7,500 (or seven Clevelands and a McKinley) in free long distance service.

We'll also waive about $2,100 (a couple of Clevelands and Grants) in installation and start-up costs.*

And after that, you'll keep on seeing more and more of these guys.

Because if your business spends $3,800 or more a month in outbound long distance, *AT&T MEGACOM WATS* gives you AT&T's biggest WATS savings over basic long distance rates.

Usage Volume discounts, Term Plans and Multi-Location WATS Calling Plans are available to save you even more.

And these savings are just part of the story. *AT&T MEGACOM WATS* gives you the advanced technology of digital access. Plus all the advantages of the AT&T network.

Still not convinced? Then use at least $2,500 a month in *AT&T MEGACOM WATS* Long Distance Service for six months. If you're not happy, we'll pay** to switch you back to whatever long distance service you're using now.

So call 1 800 247-1212, ext. 325. Or return the coupon.

And keep more of these guys right where you want them.

In your pocket.

☐ **Yes,** I want $7,500 in free long distance service. Please contact me in time to take advantage of your incredible *AT&T MEGACOM WATS* "MEGA BUCKS" offer.

Name _____

Title _____

Company _____

Address _____

City _____ State ____ Zip ____

Telephone (____) _____

Current Long Distance Service _____

Monthly Spending _____

Mail this coupon to AT&T, PO Box 45038, Jacksonville, FL 32232-9974. Or call AT&T at 1 800 247-1212, ext. 325. Or *fax* this coupon to 1 800 248-2492. Offer expires Sept. 2, 1991. Service must be installed by Nov. 1, 1991. NW429

© AT&T 1991

AT&T
The right choice.

*Service must be installed by 11/1/91. Applies to new or increased Term Plan usage.
**To take place within 30 days after the 6-month usage requirement is fulfilled.

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

CAD supplier passes NetWare NLM certification

ISICAD, Inc. recently said its **CADvance** computer-aided design software has passed a barrage of tests by Novell, Inc. to certify it as a NetWare Loadable Module (NLM). The certification ensures users that CADvance can run as an NLM on NetWare local-area networks without interfering with other NetWare processes.

CADvance includes two NLMs: one for SQL data base queries and the other to offload computer-intensive, hidden-line removal tasks for three-dimensional modeling.

ISICAD said CADvance is the only personal computer CAD package to receive NetWare NLM certification.

ISICAD, Inc., 1920 W. Corporate Way, Anaheim, Calif. 92803; (714) 533-8910.

Wang adds Mac support for accessing image units

Wang Laboratories, Inc. recently announced software that will enable Apple Computer, Inc. Macintosh computers to access services on the Wang Integrated Image Systems (WIIS) imaging system, which runs on Wang VS minicomputers.

The **MacVS Image Workstation** software, which is scheduled for availability in May, will enable Macintosh users to access, display and print images, as well as run applications on Wang VS minicomputers and Wang's office automation software products.

There are two versions of MacVS Image Workstation. One version, which enables Macintosh computers to access VS applications, costs $350 per client workstation. The other version, which enables Macintosh workstations to access WIIS applications, costs $1,500 per client.

Wang also announced server software that enables Macintosh workstations running on AppleTalk local-area networks to access applications running on Wang VS servers. That software is priced at $750 per VS server.

Wang Laboratories, Inc., 1 Industrial Ave., Lowell, Mass. 01851; (508) 459-5000.

Xyplex adds low-end unit to net server

BOXBOROUGH, Mass. — Xyplex, Inc. last week announced the MAXserver 4550, a low-end communications server that will complement the company's existing high-end model.

The MAXserver 4550 is a five-slot server chassis that, like the company's 16-slot MAXserver 5500, can house any number of communications modules to function as a terminal or print server, local-area network wiring hub or protocol converter.

According to Michael Procopio, vice-president of product marketing at Xyplex, the MAXserver 4550 is targeted at small work groups, departments or remote offices that do not have to support the large number of users supported by the company's MAXserver 5500.

The MAXserver 4550 uses the same modules as its larger sister model and supports the company's LANbus, an internal 10M bit/sec communications bus supported on the MAXserver 5500.

The MAXserver 4550 is being offered in models with either single or dual power supplies, the latter of which can provide redundancy if a primary power supply fails. Both models are available now; the single power supply model costs $3,295 and the dual power supply version costs $3,795.

Xyplex also said it has expanded support for the Simple Network Management Protocol (SNMP) in its MAXserver line. Previously, the company only supported about 30 of the most commonly used SNMP Management Information Base variables, but it has now expanded that to more than 600 variables that can be directly controlled by an SNMP workstation or a proprietary command line interface.

"That means our terminal server is now completely manageable from an SNMP station," Procopio said.

Xyplex also added support for Network Computing Devices, Inc.'s X-Remote X Window System protocol, which compresses X Window data and sends its over a serial link, as opposed to using a standard Serial Line Interface Protocol for X Window data, Procopio said.

For more information, contact Xyplex at 330 Codman Hill Road, Boxborough, Mass. 01719, or call (508) 264-9900.

Power mgmt. software to get NetWare NLM stamp

SAN DIEGO — Elgar Corp. this week expects to announce that the NetWare Loadable Module (NLM) version of its LanSafe Artificial Intelligence+ (A.I.+) power supply management software has been certified by Novell, Inc. to run on NetWare local-area networks.

Novell NLM certification would assure users that the LanSafe A.I.+ software can run as an NLM without impeding other processes running on a NetWare server, the company said.

LanSafe A.I.+ allows network administrators on NetWare LANs to centrally manage networkwide power conditions such as line voltage, network load and battery status on a range of network devices, including servers, client workstations, routers and bridges.

The software enables a LAN administrator to monitor, diagnose and adjust power parameters locally or remotely.

In a related announcement, Elgar said it has made its Layered Intelligent Network Communication (LINC) software — which is embedded in LanSafe A.I.+ and provides an interface to link to the software — available to network peripheral manufacturers so their products can be managed by LanSafe A.I.+.

Elgar said Mountain Computer, Inc. will soon announce support for the software. Both companies are expected to announce a new version of LanSafe A.I.+ that interactively coordinates remote tape backup control with power diagnostics. That release will halt a local or remote tape backup when the software detects abnormal conditions, which could create a spike or otherwise crash the backup procedure.

The LanSafe A.I.+ software works with Elgar's Intelligent Power System (IPS) line of uninterruptible power supplies. These systems range in price from $699 for the IPS/A.I. 600 to the IPS/A.I. 1200 at $1,299. The LanSafe A.I.+ software is priced separately at $135 for the NetWare NLM version.

For more information, contact Elgar Systems Division at 9250 Brown Deer Road, San Diego, Calif. 92121, or call (619) 450-0085.

Wang combines host data and LAN images

OPEN/image wares allow users to display 3270 data alongside images imported from LAN server.

By Wayne Eckerson
Senior Editor

LOWELL, Mass. — Wang Laboratories, Inc. recently announced imaging software that enables LAN workstation users to merge data from IBM host applications on the same screen as images accessed from local servers.

The software eliminates the need to download large image files from an IBM host to a client workstation on a local-area network, reducing the amount of bandwidth needed to support image-based IBM host applications.

Wang's OPEN/image-Information Management System/Data Communications (IMS/DC), resides on IBM mainframes and works in tandem with the company's OPEN/image-3270 Windows to deliver text and image data to a user on a LAN.

Together, the two packages enable a LAN workstation user to emulate an IBM 3270 terminal and query an IMS/DC application on an IBM host for data. If part of the request involves an image stored on a local server, the mainframe portion of the software issues a request to the local image server to deliver the image to the client workstation at the same time text data is displayed.

OPEN/image-3270 Windows resides on client workstations connected to the IBM host via an Ethernet or token-ring network.

"[The software] enables users to utilize their [IBM Systems Network Architecture] networks more efficiently," said Jan Nickerson, a Wang product manager here. "The transfer of large image files — which are bandwidth-intensive — is done on higher speed LANs, and the wide-area network is free for users to access host applications."

The software also enables users to run Wang imaging software on industry-standard servers attached to Ethernet and token-ring LANs.

OPEN/image consists of application program interfaces (API) that enable IMS/DC host applications to call image-processing software running on a client workstation or Wang VS minicomputer. The APIs enable the host IMS/DC application to initiate imaging functions, such as scanning, displaying, copying and printing file images, that are carried out by the image software in the local environment.

The image processing software can either be Wang's Integrated Imaging Software (WIIS), which runs on a Wang VS minicomputer or its previously announced OPEN/image-Windows software, which supports Microsoft Corp.'s Windows 3.0 graphical interface. The client workstations can either be linked directly to the host via an SNA net or attached to an IEEE 802.3 or IEEE 802.5 LAN linked to the host via an SNA gateway.

The second product, OPEN/image-3270 Windows, is 3270 terminal-emulation software that resides on client workstations and runs under Windows 3.0. The OPEN/image-3270 Windows software allows client workstations to access an IMS application using 3270 terminal emulation in one window while viewing an image or running another application in another window.

> The software "enables users to utilize their [IBM SNA] nets more efficiently."
>
> ▲▲▲

"The new products represent another positive move by Wang to open its proprietary [imaging] systems," said Ajit Kapoor, vice-president and director of image management strategies at the META Group, a consulting firm in Westport, Conn.

"The products represent a less expensive alternative for people who want to access imaging services through an IBM environment," Kapoor said.

IBM's image product ImagePlus is entirely mainframe-based and can cost anywhere from five to 10 times as much as Wang's distributed imaging system, Kapoor said.

Wang's OPEN/image-IMS/DC software costs $25,000 and the OPEN/image-3270 Windows software costs $895 per client. Both products are scheduled to ship in June.

For more information, contact Wang Laboratories at 1 Industrial Ave., Lowell, Mass. 01851, or call (508) 459-5000.

OPINIONS

SUPPORT SERVICES

BY W.D. RILEY

Compaq needs a new SystemPro support strategy

At the City of Hope National Medical Center, we use Compaq Computer Corp. file servers ranging from simple 386/20 models to the top-of-the-line SystemPro. Until now, we've been able to keep support spending to a minimum by using local expertise and the free support offered by our value-added reseller.

The SystemPro may change all that with its newly applied disk-array technology, multiple processing and operational differences. Compaq's response is to offer SystemPro users two avenues of support. The first is a dressed-up sales line, where you can expect to find product information, very basic technical assistance and current pricing. The second is a pay-through-the-nose help line in which user companies — probably only the embarrassingly rich ones — pay $3,000 for the privilege of asking 10 questions, or "incidents," as Compaq refers to them. Although this fee also includes the CDROM "Quick Find" technical manual, it's still expensive.

> If Compaq wants to make nice with their dealers, let them send a nice bowl of fruit.
>
> ▲▲▲

The notion of charging users $300 to ask a question presents all kinds of interesting scenarios. For example, if you ask a really dumb question, does the technician give you a freebie? Or are you forced to listen to dead air until you figure it out for yourself? How about multiple problems that are related? Do you get charged multiple times? What about questions the technicians can't answer? Do they still charge you? And what if they ask you a question — do you get to charge them?

"Sir, what is the serial number on your unit?"

"Fifty bucks," you respond.

"What?" the perplexed technician asks.

"Fifty bucks. I'm charging you fifty bucks for that question."

"You can't do that."

"Why not? If you can charge me three hundred bucks for my question, why can't I charge fifty bucks for yours?"

And what about refunds? If you have only five problems but have already paid your $3,000, do you get $1,500 back? Also, who determines the relationship between my current problem and another "incident?"

"I'm sorry, sir, but this is a different problem than any we've discussed in the past, and you're over your limit."

"No, it isn't; it's the same thing — honest!"

Apparently, Compaq is sharing a large part of the money generated by this help line with the value-added resellers that handle the calls. That's nice of them, considering their users are paying for it.

If Compaq wants to make nice with their dealers, let them send each one a nice bowl of fruit. The SystemPro is a great unit, but users that have already paid through the nose for the hardware shouldn't have to do likewise for support.

When problems develop and the need is critical, a well-answered question might save the day. But if you're having 10 major, time-critical problems a year with the equipment, then you've got troubles that probably won't be solved by Compaq's $3,000 support service.

If I'm stalled by the freeway in the middle of the night, I'll pay almost anything for service. However, like Blanche DuBois in "A Streetcar Named Desire," I have always counted on the kindness of strangers to charge me fairly.

Riley is a microcomputer support manager for the City of Hope National Medical Center in Duarte, Calif.

NETWORK WORLD

Editor
John Gallant
Executive Editor
John Dix
Assistant Managing Editor — News
Charles Bruno
Senior Editors
Bob Brown — Industry Update
Jim Brown — Data Communications
Barton Crockett — International Networking
Paul Desmond — Data Communications
Wayne Eckerson — Management Strategies
Eric Smalley — Local Networking
Bob Wallace — Telecommunications
Caryn Gillooly — Local Networking
7965 Tyson Oaks Circle
Vienna, Va. 22180
(703) 442-3874
Fax: (703) 442-4968
Staff Writer
Maureen Molloy
West Coast Bureau
Timothy O'Brien — Bureau Chief
2088 Union Street, Suite 2
San Francisco, Calif. 94123
(415) 771-3530
Fax: (415) 771-2817
Washington D.C. Bureau
Anita Taff — Bureau Chief
(202) 879-6744
Ellen Messmer — Correspondent
National Place
1331 Pennsylvania Ave. NW, Suite 505
Washington, D.C. 20004
(202) 879-6752

Features Editor
Paul Strauss
Associate Features Editors
Alison Conliffe
Susan Collins
Features Writer
Salvatore Salamone
Design Editors
Susan Champeny
Susan Slater
Assistant Managing Editor — Production
Beth Khoury
Associate Editor
Joanne Cummings
Copy Editors
Michelle Beaulieu
Elizabeth Marshall
Karen Moltenbrey
Assistant to the Editor
Cheryl Tynan
Editorial Assistant
Tracie Seder
Contributing Editors
Daniel Briere
James Kobielus
Edwin Mier
Alan Pearce
Teletoons
Phil Frank
Joe Troise

President/Publisher
Gary J. Beach
Director of Financial Operations
Mary Fanning

Network World
161 Worcester Road
Framingham, Mass. 01701
(508) 875-6400
MCI Mail — 390-4868
Fax: (508) 820-3467

An IDG Communications Publication

USER ADVISORY PANEL

Laurie Bride
Manager, Network Architecture
Boeing Computer Services
Roy Bruce
Senior Adviser
International Communications Association
Phillip Evans
Director, Telecommunications
FMC Corp.
President
International Communications Association
Len Evenchik
Director of Communications
The Commonwealth of Massachusetts
Thomas Festa
President
Wall Street Telecommunications Association
Lionel Gillerman
Telecommunications Services
McDonnell Douglas Aerospace
Information Services Co.
Vice-President for Regulatory Affairs
Tele-Communications Association, Inc.
E.W. Bud Huber
Senior Consultant
Hughes Aircraft Co.
Chairman, User Alliance for Open Systems
Michael Kaminski
Manager, CIM/Networking Technologies
General Motors Corp.
Ron Kopitowsky
Telecommunications Director
Metropolitan Transportation Authority, New York State
President, Communications Managers Association
Donna Kwak
Senior Vice-President
Chase Bank of Arizona
President, Tele-Communications Association, Inc.
Chuck Papageorglou
Network Administrator
United Parcel Service, Inc.
Henry Pfendt
Director, Information Technology Services
Eastman Kodak Co.
Kenneth Phillips
Vice-President, Office of Telecommunications Policy
Citicorp
Chairman, Committee of Corporate
Telecommunications Users
William Pomeroy
Director of Telecommunications Public Policy
International Communications Association
Michael Toto
President
Association of Data Communications Users
Stanley Welland
Manager, Corporate Telecommunications
General Electric Co.

EDITORIAL

FCC should scrutinize AT&T's newest Tariff 12 revision

The Federal Communications Commission should think long and hard before allowing AT&T to bend the Tariff 12 rules for selected customers.

For example, it looked like AT&T was bending the rules when it cut the minimum annual charge on its Tariff 12 deal for Bridgestone/Firestone, Inc. by 61% earlier this month. That amounted to a loss of about $4 million in AT&T's guaranteed annual revenue, from $6.455 million to $2.5 million.

A Tariff 12 change of that magnitude is truly unprecedented. In fact, AT&T told an appeals court last year that its minimum annual charges are "immutable." But now, AT&T has chosen to alter that policy.

Why? In its FCC filing, AT&T said Bridgestone/Firestone was having severe business difficulties and couldn't meet its minimum annual charges.

But what if other companies can't meet their minimum annual charges? Can AT&T forgive millions of dollars in commitments for one customer and not for another?

AT&T rightly says that each Tariff 12 deal is a custom package and that some differences are bound to arise among them. But when the company refiles a Tariff 12 deal, does it make sense for the FCC to allow the carrier to alter such fundamental contract provisions as the guaranteed annual charges?

Under the refiled Bridgestone/Firestone tariff, AT&T's guaranteed profit during three years amounts to only $790,000 — so it's difficult to understand why AT&T made this decision.

Although AT&T has come to the rescue of a customer in distress, it has likely opened itself up to renewed charges of discrimination. Already, opponents claim there is little rhyme or reason to the pricing strategy AT&T uses between one Tariff 12 deal and the next.

In a recently filed complaint, US Sprint Communications Co. analyzed AT&T's more than 80 Tariff 12 deals, saying the data seems to show there is no correlation between volume commitments and prices. This runs counter to the traditional logic of volume discounts in which prices decrease as volume increases.

AT&T responded that it considers many variables when setting up one of its custom network deals. For example, in exchange for prices that are not distance-sensitive, a particular user may be willing to pay a slightly higher price per minute than another user.

Therefore, the FCC should ask AT&T some hard questions about the fairness of the carrier's policies on Tariff 12 before it lets the revised Bridgestone/Firestone deal take effect.

OPINIONS

Should fiber usage in the local loop be a priority?

PRO:

By HAL SELANDER

The widespread deployment of a fiber-optic telecommunications infrastructure in the U.S. is not only cost-effective, but also critical to our long-term economic prosperity.

Telecommunications policies have already achieved the objective of widely available, affordable telephone service. These policies have supported the development of a local exchange carrier network that provides low-cost, basic service as well as some enhanced voice and data services.

However, today's policies look backward, not forward. Our copper telecommunications infrastructure — as good as it is — is inadequate for transporting the bandwidth we routinely use at the desktop, in our homes, or on private or local-area networks. Prospective video or broadband services will require entirely new network capabilities and will further highlight flaws in today's policies. Currently, those policies restrict the practical implementation of interactive information and switched video programming services to the home.

As the U.S. continues to move toward an information- and service-based economy, today's local exchange carrier networks will increasingly constrain residential and small business users' ability to participate in the information age. About 30 million to 35 million Americans now work at home, unable to cost-effectively access the services, customers or suppliers that large companies access. Those firms can enhance their productivity and competitiveness through bypassing the local network, but their work-at-home employees face the limitations of the public switched network.

Technological upgrades to the telecommunications infrastructure will stimulate economic development in depressed areas, and with widespread deployment, we can increase our overall competitiveness as a nation. We can also assist in advancing the public policy agenda by using technology to catalyze excellence in education and improved

(continued on page 58)

Selander is a Boston-based independent management consultant specializing in business strategy for technology-driven businesses. He has authored other articles and has provided Senate testimony on the economics of fiber optics.

CON:

By ARTHUR BARBER

News releases indicate that most local exchange carriers are anxious to provide fiber to the home. However, no one has explained why or how they plan to do so.

We are told that fiber has more bandwidth than copper. But most American homes have all the bandwidth they need; certainly, people shouldn't be forced to pay for broadband fiber service they don't want.

The existing switched voice network works economically, and by now, users' monthly fees should have paid for most of the capital plant. Most people want economical switched voice service, not higher telephone bills.

Similarly, those who receive cable television don't care whether programs are transmitted over coaxial cable or fiber. More than 50% of American homes are served by coaxial systems that are not obsolete and, therefore, don't need to be replaced.

The proposed programs for fiber to the home that have been made public have neither a sound design nor an economic rationale. Why then is there so much emphasis on fiber to the home when there is little public demand? Some say the answer is greed, but it is probably more accurate to say that it's stupidity.

We are seeing a turf war between the telephone and cable industries. The local telephone industry wants to compete for the revenue of the cable industry, and the cable industry wants to obtain additional revenue by providing telephone service. Both seek an effective monopoly in providing broadband access to the home.

Lawyers appear to be the leaders in this turf war. This is evident in both the designs and the arguments put forth by the telephone and cable industries.

Local exchange carriers, seeking to justify their claims of having the best method of competing with the CATV monopolies, say they can design a television distribution system based on the combination of fiber to the home, the use of existing telephone switching centers and neighborhood broadband switches.

The cable industry argues that it can provide

(continued on page 55)

Barber is president of Bethesda, Md.-based PrivateNet, which designs and installs custom private networks.

TELETOONS

BY FRANK AND TROISE

LETTERS

Misleading stats

I'm writing in response to the recent column by J.A. Hooke ("A small difference turns into big savings," *NW,* April 1).

I enjoy reading *Network World* each week and appreciated Mr. Hooke's detailed economic analysis regarding the price/performance ratio of AT&T's 800 services. However, his analysis contained many assumptions that, when brought to light, might negate most of his calculated savings of 27% in service costs.

The first assumption was the lost opportunity cost of $50 per 800 service call.

With nine lost calls for every thousand attempts, an assumed profit margin of 30% (high) and a service cost to the customer of $500 per thousand calls, Mr. Hooke extrapolates that the impact of other carrier's services (with reduced call setup times and higher blocking) amounts to $450 of opportunity lost per 1,000 calls, which translates into $135 in lost profit.

(continued on page 55)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can put the bite on a communications operation. Many managers wrestle with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.

ILLUSTRATION ©1991 ALAN HOPKINS

Is it the end of the line...

CONTINUED FROM PAGE 1

be able to support 100M bit/sec transmission for any reasonable distance, the consensus of experts holds that at rates above 100M bit/sec, only fiber will do. (For an evaluation of cabling choices, see Figure 1, page 57.)

Not discussed here is the alternative of using the new radio local-area networks to replace copper. The issue is solely unshielded twisted pair vs. shielded twisted pair vs. fiber. Coaxial cable, a medium used by practically all LANs five years ago, is rarely being installed these days.

OK for Ethernet?

It is generally accepted that unshielded twisted pair is an adequate medium for Ethernet's 10M bit/sec data rate. This is noteworthy because two years ago, questions arose regarding whether the new Ethernet-over-unshielded twisted-pair specification, 10BaseT, could meet Ethernet's specified low error rates and the Federal Communications Commission's anti-radio-emission requirements.

Recently the network medium of choice, twisted pair may not be up to handling users' increasing bandwidth needs.

It's also worth noting the limitations of 10BaseT as compared with traditional Ethernets. Ethernets can use a single thick coaxial cable for distances as long as 1,650

(continued on page 43)

Mier, a Network World contributing editor, is president and founder of Mier Communications, Inc., a Princeton Junction, N.J.-based computer networking and communications consultancy.

...for twisted pair?

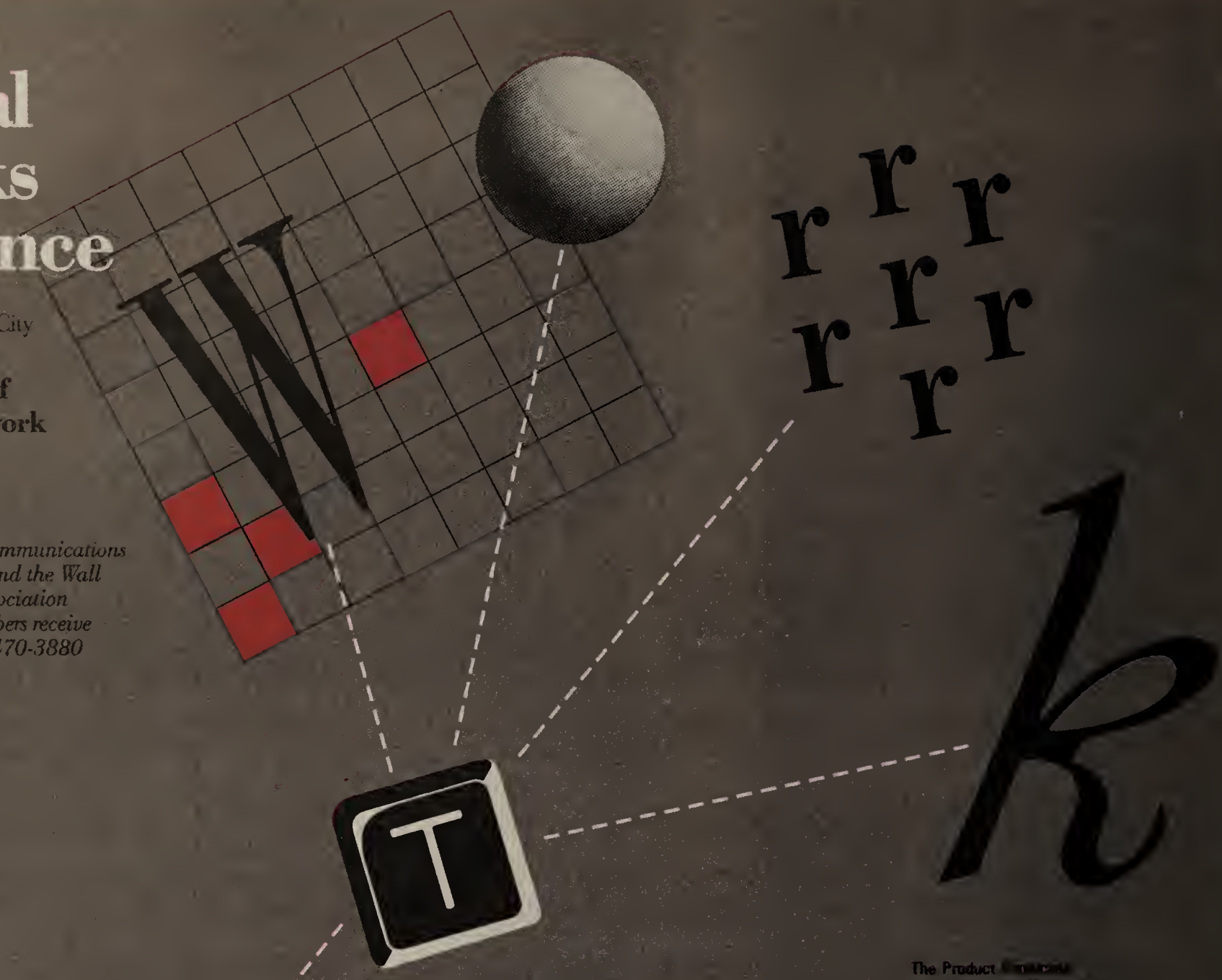
Network World and Digital Consulting, Inc. present:

The Financial Networks Conference

May 8–9, 1991 • New York City

The First in a Series of Vertical Industry Network Conferences.

Held in conjunction with the Communications Managers Association (CMA) and the Wall Street Telecommunications Association (WSTA). CMA and WSTA members receive a special discount. Call (508) 470-3880 for details.



Gain the Insights and Information You Need

Financial network executives face unique problems and challenges. The Financial Networks Conference was designed by users for users to address those specific problems and challenges head-on. This conference provides you with a diverse mix of viewpoints on the management concerns and technology issues shaping the financial networks world. Over 20 top network executives, consultants and analysts from the financial industry will tell you about their real-world experiences and give you the practical, how-to advice you need to compete in the 1990s.

The Issues are HOT...

- How to develop winning long-term financial network strategies
- Benefits of financial network partnerships
- Does outsourcing your network make sense?
- How to negotiate custom network contracts
- Ways you can control market data feed costs
- How to build integrated financial network platforms
- How to implement effective international networks
- How to prepare for 24-hour trading and automated trading
- Disaster planning and recovery strategies
- How to get an iron grip on costs

To register or to receive a complete brochure call Digital Consulting at (508) 470-3880.

The Product [illegible] at The Financial [illegible] Conference [illegible] the opportunity to interact [illegible] top networking [illegible] gain the product [illegible] and information you [illegible] to make key product purchasing decisions.

3Com Corporation
A+ Networking Solu[illegible]
Amtrak Fiber Express
Bytex Corporation
Cabletron Syst[illegible] Inc.
Chipcom Corporatio[illegible]
Cisco Systems
Computer Network Tec[illegible]
Data Net Inc. representing Network General Corp.
Digicom Systems Incorporated
GTE Spacenet Corporation
Isicad Inc.
JWP Information Systems Network Services Group
Netrix Corporation
Network Systems Corporation
Northern Telecom Inc.
Output Technology Corp.
Primary Access Corporation
Proteon, Inc.
Spectron [illegible] Inc.
Sungard [illegible] Services Inc.
[illegible]
[illegible] Group
[illegible]

Network World/Digital Consulting, Inc. present:

The Financial Networks Conference

May 8–9, 1991 • New York City

Wednesday, May 8

Welcome/Opening Remarks
• John Gallant, Editor, *Network World*

The Financial Networks Forecast
• DuWayne J. Peterson, Executive Vice President of Operations/Systems and Telecommunications, Merrill Lynch & Co., Inc.

Winning Network Strategies for a Volatile Marketplace
• Jeff Marshall, Managing Director, Communications, Bear Stearns & Co., Inc.
• John Lane, Executive Vice President, Director of Communications, Shearson Lehman Brothers

Luncheon and Product Showcase

Financial Network Partnerships
• Ken Kolakowski, Vice President & Principal, Walsh-Lowe & Associates
• George Kenney, Senior Vice President, O'Connor & Associates, Chairman, Securities Industry Communications Organization, former CIO of American Stock Exchange

Disaster Planning and Recovery Strategies
• Tari Schreider, President, Contingency Planning Research
• Edward Regan, VP, Manufacturers Hanover Bank, 1990 Chairman, Telecommunications Committee, NY Clearing House Assoc., Chairman, International Information & Telecommunications Policy Committee, U.S. Council for International Business

Outsourcing the Network: If, When and How?
• Bruce Allen, Program Director, Services & Maintenance Strategies, The META Group

The Impact of Wireless Trading Networks
• Lee Doyle, Manager, Local Area Networks Program, International Data Corp.
• John Diesem, Senior Vice President, Systems Technology, American Stock Exchange

The New York City Network: Single Point of Failure?
• Wayne Eckerson, Senior Editor, Management Strategies, *Network World*
• Kenneth Phillips, Chairman, Committee of Corporate Telecommunications Users
• William Squadron, Commissioner, New York City Department of Telecommunications
• Tom Dillon, Managing Director, Network Technology, New York Telephone Co.

Thursday, May 9

Product Showcase

Preparing for 24-Hour Trading
• Allan Grody, President, Financial InterGroup Holdings Ltd.
• Tom Burnett, Managing Director, International Equity Trading, Merrill Lynch & Co.
• Dick Justice, Vice President, Automation, NASD

Integrated Financial Network Platforms
• John Gallant, Editor, *Network World*
• Steven Levy, Vice President, The Putnam Companies
• Bernard Weinstein, President & CEO, ILX Systems, Inc.

Luncheon sponsored by GTE Spacenet Corporation

Negotiating Custom Network Arrangements
• Gary Badberg, Vice President, Corporate Telecommunications Utility, American Express Travel Related Services
• Daniel Briere, President, TeleChoice Inc. and Contributing Editor, *Network World*

Global Networking Strategies
• Leonard Elfenbein, President, Lynx Technologies, Inc.
• Rick Higgins, Senior Vice President, Telecommunications, Security Pacific Bank

Controlling Market Information Costs
• Dennis Waters, President & Editor-in-Chief, Waters Information Services
• Steve Silberstein, President, Silberstein & Company Inc.

Building Automated Exchanges
• Walter Reisch, Executive Director, ICCH Financial Markets Ltd.
• Dick Justice, Vice President, Automation, NASD

Controlling Costs While Providing a Competitive Advantage
• Jim Jewett, PhD, Co-founder, Telco Research Corp., noted author & speaker on entrepreneurship, leadership, & telecommunications

Friday, May 10 (Optional)

The Imaging Advantage Tutorial
• Roger Sullivan, VP, Image Management Systems, BIS CAP International
• Bruce Silver, PhD, Director, Image Management Systems, BIS CAP International

[illegible] to receive a complete brochure call Digital Consulting at (508) 470-3880.

ATTN

T1 CSU

If you're paying more than $995.00 for your ESF/D4 T1 CSU...

T1 ESF CSU's		
Anderson Jacobson	**5981**	**$995**
Digital Link	DL55IX	$2495
Kentrox	T-SMART	$2550
Larse	TCSU-0100-05B	$2545
Verilink	551VST List 2	$3250

All prices provided by respective manufacturers.

You are paying too much!

Anderson Jacobson's 5981 is a cost effective and convenient solution for single T1 line termination.
AT&T CERTIFIED.

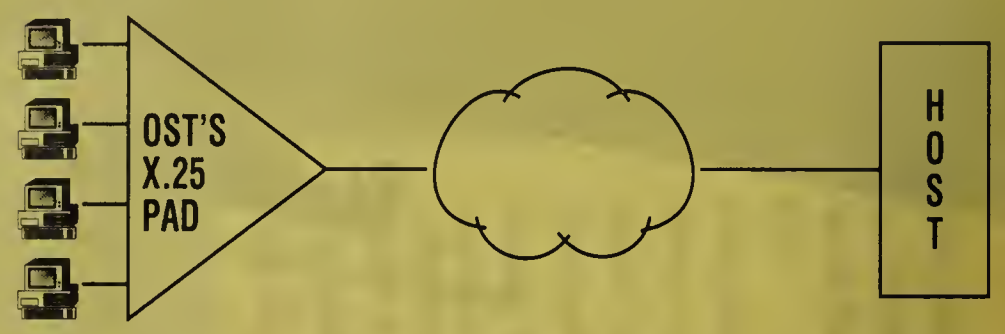
Call now
for the name
of your local distributor.
1-800-537-5762
Extension 263

ANDERSON JACOBSON
- A CXR Company -
521 Charcot Avenue
San Jose, CA 95131
FAX (408) 435-1276

Circle Reader Service No. 14

X.25 NETWORK CONNECTIVITY

THE X.25 CONNECTION: $995



FEATURES:

- Full support for CCITT (1984) X.25, X.3, X.28, X.29
- Fully programmable PAD configured from any standard asynchronous terminal.
- Expandable up to 16 asynchronous ports, offering a per port cost of only $137 per port.
- Advanced PAD features such as the display of a directory of abbreviated addresses at connection time, autocall capabilities, hardware flow control, etc.
- Because of the Non-Volatile EEPROM, the configuration data remains unaffected in the event of a power loss or shutdown.
- X.25 and asynchronous line statistics and diagnostics can be collected and analyzed for optimizing network performances.

SUPPORT:

Free one year warranty service provides 24 hour a day, 7 day a week customer service. Comprehensive training courses are available for X.25 and specific OST products.

OST
Networking Intelligence

For Further Information write or call:

OST, Inc.
14225 Sullyfield Circle
Chantilly, VA 22021
U.S.A
Tel: (703) 817-0400
FAX: (703) 817-0402
Modem: (703) 817-0456, 2400 Bps; (703) 817-9846, 9600 Bps, 8N1

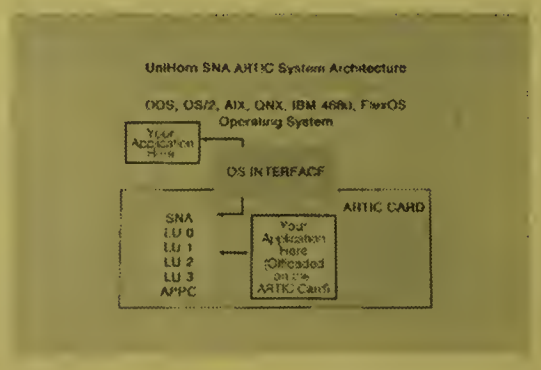
Circle Reader Service No. 18

ARTIC COMMUNICATIONS SOFTWARE

"UniHorn SNA is the #1 Solution to RAM CRAM!" - Ron Carson, IBM

UniHorn offloads *all* SNA communications support onto the IBM ARTIC card.

UniHorn SNA:
19.2 & 56 KB Data Transfer
Allows users to offload Communication Applications
Uses no System Resources
Primary & Secondary SDLC
Supports 3270 and APPC
Supports PU 2.0/2.1 and LU Types 0, 1, 2, 3, 4, 7, 6.2
DOS, OS/2, AIX, QNX, and IBM 4680



UniHorn
(408) 655-1117
FAX (408) 646-0620

Circle Reader Service No. 1

COMPLETE LAN SERVICE

BUY SELL OR REPAIR LAN HARDWARE
Complete LAN Service

We are a component (chip) level repair depot that buys and sells used or new LAN Hardware.

Hardware Specialties:
3 Com • Corvus • IBM • Interlan • Novell • Proteon • Standard Micro Systems (SMC) • Western Digital • Pure Data • Gateway • Thomas Conrad • Tiara & Others

LANFIX/LAN RECYCLERS
1-800 448-7420

FAX: 1-800 752-6958
PHONE: 1-801-226-1832
1378 West Center St. • Orem, Utah 84057

Circle Reader Service No. 12

DATACOMM MATRIX SWITCH

BLOCKED BY OLDER
MATRIX SWITCH TECHNOLOGY?

Discover the ***NEW DIMENSIONS*** in Network Management Technology
With the ***MTRX*** Family of ***TANDEM*** Electronic Matrix Switches

MTRX-500	512 Ports
MTRX-4000	4096 Ports
MTRX-8000	8192 Ports

BENEFITS	MTRX	OTHERS
*Largest **Non-Blocked** Port Capacity...**8192 PORTS**	YES	NO
*Up To **98%** Data Cable Reduction DTE to DCE	YES	NO
*4000 FT DTE TO DCE With Twisted Pair Cable	YES	NO
*LAN Based PC Control - Ethernet Or Token-Ring	YES	NO
*Multi-tasking (VM-386) Universal Workstation	YES	NO
*Integral BERG/BERT and S.A.M. Test Functions	YES	NO
*Non-Proprietary Database, dBASE III PLUS/IV	YES	NO
*Supports Data Rates To 2.048MBPS	YES	SOME

Over 30,000 Ports Installed At RBOCs and Fortune 1000 Companies

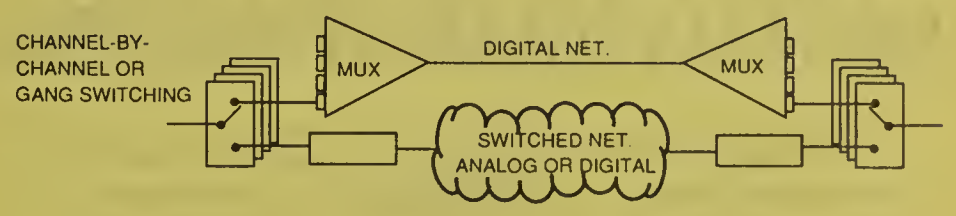
Datacomm Management Sciences Inc.
"The Responsive Ones"
25 Van Zant Street
East Norwalk, CT 06855
TEL: (203) 838-7183

dBASE III PLUS/IV are trademarks of Ashton-Tate Corporation

Circle Reader Service No. 2

DISASTER RECOVERY

DIGITAL FALLBACK SWITCHING



Don't let network failures stop your critical communications. Dataprobe provides automatic and remotely controlled switching systems that can restore failures in T1, DDS and Fractional T1 networks. Our systems detect failures in the communications link and automatically switch to either a redundant link or to switched services. If your network requires 'Maximum Uptime', call Dataprobe now.

dataprobe INC.

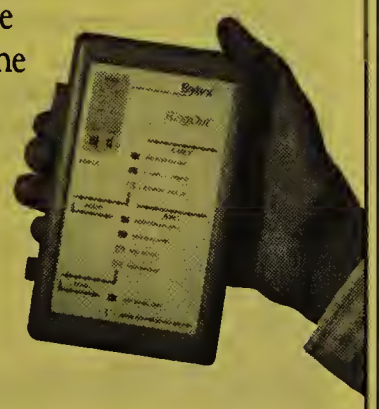
170 Coolidge Avenue / Englewood, NJ 07631
Phone: (201) 569-6464 Fax: (201) 894-0939

Circle Reader Service No. 16

DIAGNOSTIC TEST EQUIPMENT

Get your hands on the most comprehensive Token Ring cable tester for only $1495.

Introducing the Bytex RingOut cable tester—the first designed specifically for Token Ring. And the easiest-to-use. ▪ Tests 4 and 16 Mbps STP and UTP LANs. ▪ Detects damaged or improperly installed cables or connectors. ▪ Confirms correct operation of MSAU. ▪ Detects and isolates beaconing nodes. ▪ Works on live LANs—no shutdown required. *Find out about our 30-day money back guarantee.*



Call 1-800-23-BYTEX for details now.

Bytex

Bytex is a registered trademark of Bytex Corp.

Circle Reader Service No. 3

ESF CSUS

$500.00 CASH BACK

Upgrade to the reliability of Verilink Intelligent ESF CSU's and we will give you $500.00 cash back or credit towards your purchase. Take advantage of the leading manufacturer of ESF CSU's and the network management benefits of ESF now.

Call Us Today Toll-Free At
1-800-669-4278
For your ***free*** Verilink planning kit.

The Helfrich Company
19782 MacArthur Boulevard
Suite 310, Irvine, CA 92715

VERILINK

Circle Reader Service No. 19

DIAL-UP MANAGEMENT

Optimize Dial-up Modem Network Utilization

With CDI's Patented Network Windows™ Management System

CDI's PC based Dial-up Modem Network Management System has been field proven worldwide since 1983. Reduce your line costs and prevent client loss with these features:

- Modem vendor independent-works with any modem type
- Provides local reconfiguration from the keyboard
- Generates complete daily usage and error reports
- Automatic busy of "ring no answer"
- Central site management of a distributed network
- UL approved

CDI - The Answer To Dial-Up Modem Management
Call or Write For Information & Demo Disk

Communication Devices Inc. • 1 Forstmann Ct. • Clifton, NJ 07011
Phone 201/772-6997 • Fax 201/772-0747 • 800/359-8561

CDI

Circle Reader Service No. 4

ETHERNET NETWORK MONITORING SYSTEM

The Network Professor®

- **Multi-Segment** Ethernet/IEEE 802.3 LAN Monitoring System.
- Global Network Monitoring and from **ANY** Location.
- Monitors **ALL** LAN traffic conditions on every segment, for all Stations/Nodes and Protocols, **simultaneously**.
- Alarming for user defined thresholds and detection of error conditions, resulting in **decreased downtime costs**.
- **X-Motif or ANSI** user interface provides access to current and historical network statistics via a Relational Database.
- Complies with **ISO Standards** for Enterprise Management.
- Industry proven since 1989. (**CALL NOW** for Fortune 500 references.)

"...only fully functional LAN Monitoring System..."
Bill Hancock

For Literature and your **FREE** Evaluation Package
CALL (213) 379-2505
*Look for our NEW **4 port Local Bridge!***

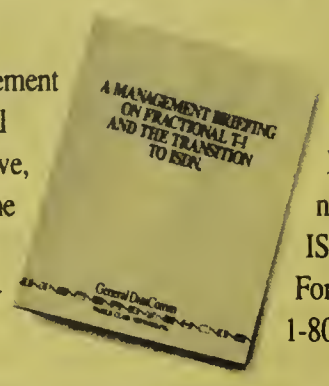
Technically Elite Concepts®

Circle Reader Service No. 5

FT-1/ISDN MANAGEMENT BRIEF

FREE FRACTIONAL T-1 AND ISDN MANAGEMENT BRIEFING.

This important Management Briefing puts Fractional T-1 clearly in perspective, and clarifies much of the confusion associated with it while emphasizing economic issues,



network management, and the transition to ISDN. Additionally, the new concept of Fractional ISDN is examined. For your free copy, call 1-800-777-4005.

General DataComm

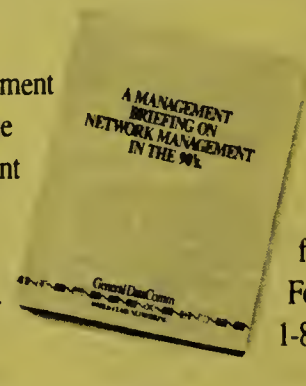
WORLD CLASS NETWORKING

CORPORATE / INTERNATIONAL HEADQUARTERS 203-574-1118 HONG KONG 852-833-6779 CANADA 416-498-5100
AUSTRALIA 61-2-956-5099 UNITED KINGDOM 44-734-774868 FRANCE 33-1-30570200 JAPAN 81-33-862-1730
Circle Reader Service No. 38

NETWORK MANAGEMENT BRIEF

FREE NETWORK MANAGEMENT BRIEFING.

This important Management Briefing details the Wide Area Network equipment vendor's approach to managing an increasingly complex network. With this information,



the network manager will be better equipped to provide the network end-user with full network connectivity, functionality, and flexibility. For your free copy, call 1-800-777-4005.

General DataComm

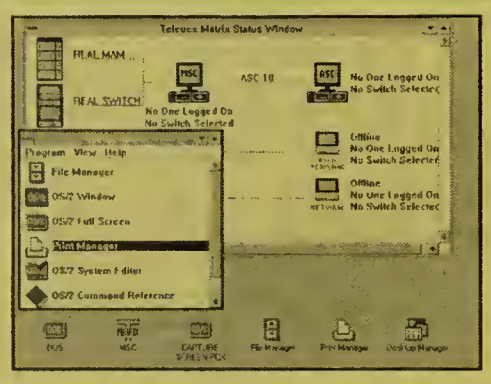
WORLD CLASS NETWORKING

CORPORATE / INTERNATIONAL HEADQUARTERS 203-574-1118 HONG KONG 852-833-6779 CANADA 416-498-5100
AUSTRALIA 61-2-956-5099 UNITED KINGDOM 44-734-774868 FRANCE 33-1-30570200 JAPAN 81-33-862-1730
Circle Reader Service No. 39

MATRIX SWITCHING

Another Telenex Matrix Switch Advantage . . .

Multi-tasking OS/2 System Workstations



Only the Telenex Matrix Switch offers the ability to run multiple appplications concurrently on a single OS/2-based workstation. Such as operate a remote Telenex AUTOSCOPE™ or AR INTERVIEW® protocol analyzer. Or establish bidirectional communications between the Matrix Switch and IBM's NetView or Systems Center's NET/MASTER. Even control a worldwide network of Telenex Matrix Switches.

Now, besides having speed and capacity that exceed others, the Telenex Matrix Switch has the most flexible and convenient system management platform.

TELENEX CORPORATION
A UNIT OF GENERAL SIGNAL

Matrix Switching Systems
13000 Midlantic Drive • Mount Laurel, NJ 08054
800-222-0187 609-234-7900 609-778-8700 (FAX)

Circle Reader Service No. 6

NETWORK MANAGEMENT SOFTWARE

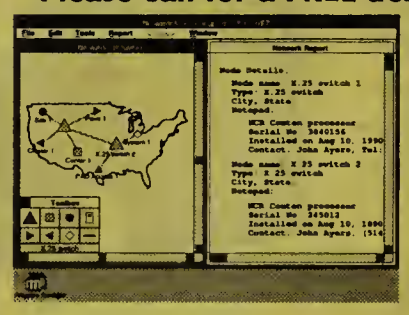
SnapNET™ Makes WAN and LAN Management A Snap!

$995 Single-copy Price.

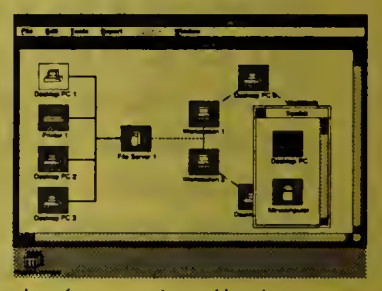
SnapNET is a user friendly software tool that allows a network manager to build, display, track, and modify WAN/LAN topological layouts, and create network databases/directories and graphic presentations.

SnapNET's major advantage is its ease-of-use. It takes advantage of MS-Windows 3.0's point-and-click, multi-windows, and toolbox/toolkit functions.

Ask us about our North American and world map versions. Please call for a FREE demo disk.



Place a node or link simply by pointing and clicking. WAN and LAN reports will give you complete summaries.



Use the toolkit to create and configure your local area network. You may select from a variety of hardware icons (e.g., PC, printer, mainframe, fileserver, etc.).

NETWORK MONITORING, INC.
2041 Mission College Blvd., Suite 170
Santa Clara, CA 95054
Phone: (408) 986-1166
Fax: (408) 986-8174

Circle Reader Service No. 13

MULTIPLEXERS

3270 MULTIPLEXERS

Harris Adacom is the IBM™ 3270 multiplexing expert, offering up to 128 port solutions as alternatives to the exorbitant expense of coax or fiberoptic cabling, as well as IBM 3299 and 3299-032 compatible units.

* IBM COMPATIBILITY
* LOW COST
* EASY INSTALLATION
* COAX/FIBEROPTIC/TP SUPPORT
* LOW POWER CONSUMPTION
* COMPACT SIZE

CALL TOLL-FREE TODAY 1-800-327-0232

FREE CATALOG

HARRIS ADACOM

10409 West 84th Terrace
Lenexa, KS 66214
FAX: (913) 888-4103

Circle Reader Service No. 15

Send For Free Info

NW Apr 91

For more information on any of the products and services advertised in *NetworkWorld's ActionCenter*, circle the Reader Service Numbers on this coupon which correspond to the advertisement of interest to you.

Complete the coupon information and mail to:
NetworkWorld
P.O. Box 5090, Pittsfield, MA 01203

Expires 7/31/91

Name _____
Title _____
Company _____
Phone ( ) _____
Street _____
City _____
State _____ Zip _____

NW Apr 91

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	
18	19	20	21	22	23	24	25	
26	27	28	29	30	31	32	33	
34	35	36	37	38	39	40	41	
42	43	44	45	46	47	48	49	
50	51	52	53	54	55	56	57	

PC BASED PROTOCOL ANALYZER

A PC-based protocol analyzer that's serious about portability.

The LM1® is a PC-based protocol analyzer with a lot of get up and go. In a laptop, it weighs less than 15 pounds. You get maximum portability so you can zero in on problems in the shop or in the field. The remote option lets you monitor off-site lines, and captured data can be analyzed on any PC.

The LM1 gives you in-depth plain English decodes, BERT/BLERT testing, time stamping, and interactive simulation.

We're serious about performance and portability. Call us at (708) 574-3399.

Progressive Computing

Progressive Computing, Inc.
814 Commerce Drive, Suite 101
Oak Brook, IL 60521 USA
(708) 574-3399 FAX (708) 574-3703
Circle Reader Service No. 7

LM1 is a registered trademark of Progressive Computing, Inc.

PREMISES WIRING

Is your cable plant running out of bandwidth?

When does it pay to install fiber?
Will IBM Type 1 handle your data needs for the next 5 years?
How about integration with PBX cabling? ISDN?

Need cabling solutions tailored to suit your organization's needs? We can help. **East Coast Corp.** is a unique, independent premises-wiring consultation and installation service provider.

If you're in the Northeast U.S. and have premises wiring questions, our full range of data and telecommunications premises cabling installation and design services can provide you with the answers:

- **Advisory service by phone, fax and fed-ex**
- **Fully licensed copper and fiber installation**
- **On-site needs analysis, cost estimation**
- **Architectural programming, preparation of bid specs**
- **Backgrounder reports on cabling technology, trends**
- **Specialists in voice/data, LAN/telecom integration**

East Coast For premises cabling answers

609-392-1519 /or 609-275-8756
777 N. Clinton Ave.
Trenton, NJ 08638

Circle Reader Service No. 10

PC LAN/WANG VS CONNECTIVITY

Wang VS Users:

Hitch It or Ditch It

PC Local Area Networks are here to stay, and changes are inevitable.

However, if the decision has been made to ditch the VS, more changes lie ahead.

You could hitch your VS resources to PCs, LANs and Macintoshes by adding Lightspeed NVS. The results: regained control of PC resources, powerful applications made available to more people, and improved work group productivity. Plus no loss of investment.

Add Lightspeed MAIL Gateway, and you can even exchange mail between Wang Office and PCs.

And Lightspeed NVS can help you with all of them.

You'll need to move all the data off the VS, convert documents to new word processing formats, and somehow run the primary VS procedures while you're in the process of migrating away. You'll want to run both systems parallel for awhile, too.

So, whatever you decide to do with your VS, call us.

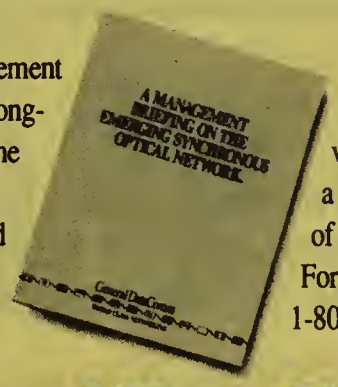
MacSoft

Circle Reader Service No. 8
(805) 324-4291 ext. 51, 1800 19th Street, Bakersfield, CA 93301

SONET MANAGEMENT BRIEF

FREE SONET MANAGEMENT BRIEFING.

This important Management Briefing explores the long-term ramifications of the Synchronous Optical Network (SONET) and its potential impact on private networks.



This briefing compares the strategic value of T-3 versus SONET and provides a comprehensive overview of fiber optic standards. For your free copy, call 1-800-777-4005.

General DataComm

WORLD CLASS NETWORKING

CORPORATE / INTERNATIONAL HEADQUARTERS 203-574-1118 HONG KONG 852-833-6779 CANADA 416-498-5100
AUSTRALIA 61-2-956-5099 UNITED KINGDOM 44-734-774868 FRANCE 33-1-30570200 JAPAN 81-33-862-1730

Circle Reader Service No. 11

PERIPHERAL SHARING

Cable-Free Printer Sharing!

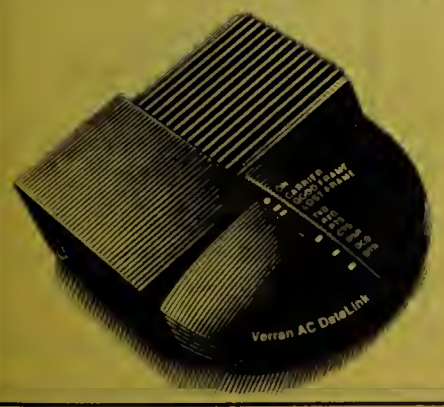
Eliminate the hassle -- and expense -- of cabling with the GEC-Marconi/Verran AC DataLink Cable-Free Computer Connection System. Attach a DataLink to a serial or parallel computer and a DataLink DPS to a parallel printer. Then, simply plug each DataLink into an electrical outlet and data transmits via your building's AC wiring. Connect up to seven computers to one printer within minutes. No extra software needed. No cabling. Just plug them in!

Prices are just $345 for the AC DataLink and $395 for the AC DataLink DPS. Ask about our 30-day money-back guarantee!

For more information and free brochure, call 703-648-1551.

For mail order and credit card orders, call 800-456-4123.

Dealer and distributor inquiries invited.



GEC MARCONI
SOFTWARE SYSTEMS

GEC-Marconi Software Systems
Suite 450, 12110 Sunset Hills Road
Reston, Virginia 22090
Tel: 703-648-1551 Fax: 703-476-8035

Circle Reader Service No. 17

X.25 CONNECTIVITY

NO CARDS NEEDED!

Save money with X.25 Software Solutions from the ***PC Technologies Division at Microdyne***

Introducing...
the pcX25 product line with TTY, VT52 and VT100 Async terminal emulation providing compatibility with host mainframe terminal support
and...
the snX25 product line with all the features of pcX25 plus 3270 terminal emulation for connectivity to IBM™, SNA and non-IBM™ hosts.

Microdyne

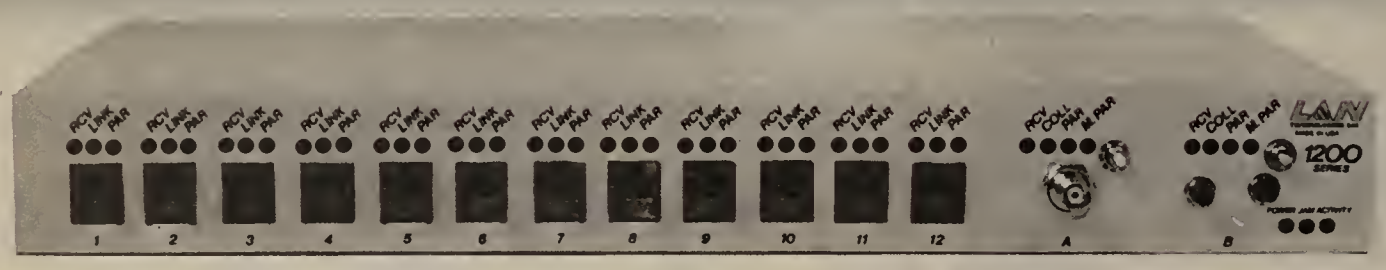
Circle Reader Service No. 9
Microdyne's PC Technologies Division
491 Oak Rd. • Ocala, Florida 32672
In U.S. (904) 687-4633 • TWX 810-858-0307 • FAX (904) 687-3392

NETWORKING MARKETPLACE

AFFORDABLE & RELIABLE

10 BASE-T

TODAY!



L&N Technologies, Ltd. announces the Model 1200 Series, a fourteen port 10 BASE-T hub for unshielded-twisted-pair (UTP) ethernet networks. Features include:

- Twelve UTP RJ-45 Ports
- Universal Power Input
- Two Optional Ports for BNC, Fiber and/or AUI
- Automatic Partitioning for Network Failure Isolation
- LED's for Line Status, Receive Data & Collision
- Two Year Return to Factory Warranty

DISTRIBUTOR INQUIRIES WELCOME

L & N also manufactures a complete line of Ethernet Repeaters

L&N TECHNOLOGIES Ltd.

2899 Agoura Rd., Suite 196
Westlake Village, CA 91361-3200
Tel: (805) 494-4191 Fax (805) 494-3942
European Sales Office (Tel): (0) 602491010
United Kingdom (Fax): (0) 602491019

Network World 1991 Editorial Features

May 13

Trends Reshaping Networks: Security
Special: Lead Service

May 20

Virtual networks update

May 27

SNA Update

June 3

1. Buyer's Guide: Bridges/routers
2. Survey: Critical issues facing users
Show Distribution: ICA
Special: Lead Service

June 10

Buyer's Guide: Bypass equipment

June 17

Voice processing

June 24

Buyer's Guide: SNMP management tools
Special: Lead Service

July 1

Videoconferencing

July 8

Buyer's Guide: T-1/T-3 multiplexers
Special: Harvey

July 15

1. Moving to OS/2: How, when, why?
2. Network management update
Show Distribution: ComNet West; Net. Computing Forum
Special: Lead Service

July 22

LAN management update

July 29

Technology Trends: Packet networks of the future

August 5

Focus on applications architectures

August 12

Buyer's Guide: Virtual network services
Show Distribution: DCI/NW Mfg. Nets
Special: Lead Service

August 19

LAN Internetworking strategies

ComNet West

Special ComNet West Show Issue - July 15

Closes: July 3rd

Bonus Distribution

Call for further information on advertising in this Special Issue.

1-800-622-1108 (In MA): 508-875-6400

READERSHIP LEADER

Unlike vertical technology publications, *Network World* has the only editorial format that covers all the technologies pertaining to the enterprise network.

That's why *Network World* is winning many of the industry's most prestigious and independent readership studies:

1989 Communication Networks	#1
1989 ADCU Member	#1
1988 Wall Street Journal ICA Member	#1
1988 TCA Member	#1
1988 TFS Network Management	#1
1988 TFS MUX Market	#1
1988 TFS Modem & DSU	#1

CALL FOR PAPERS

CALL FOR PARTICIPATION

Be part of the 1992 UniForum Conference, the premier event in the UNIX and Open Systems arena. Submit proposals for *tutorial presentations, panel sessions* or *technical papers.*

Event theme is:
UNIX: The Open Advantage

For your proposal submission form, call: **800-255-5620**
(FAX: 408-986-1645)

CALL TODAY!
Proposal Deadline is June 1, 1991

UniForum.
January 20 – 24, 1992
Moscone Center • San Francisco

BIDS & PROPOSALS

Seeking Responses From MWBE & DVE's For Assistance With: Financing.

Solicitation #6823

Financing Of A 4381

Your Response Needed: As Soon As Possible

Contact: Ed Shirhall
(916) 326-5024
Fax: (916) 326-5877

IBM

A Smart Multi-Media MAU

For Your 4/16 Mbps Token Ring Network

With Network Management Software

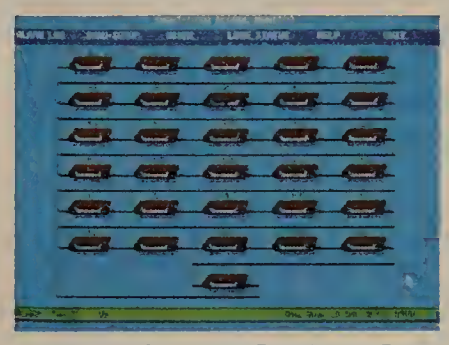
MULTI-MEDIA
UTP - STP - FIBER

The **GT16NM Is a SMART MAU** available with 8 or 16 UTP Lobes. When used with our PTMF16 Media Filter you get maximum Lobe distance. (Use our standard GT16N for STP Lobes.) You may select Ring Port Options for STP, UTP or Fiber Optics. There is no other product available that can provide more features and flexibility.

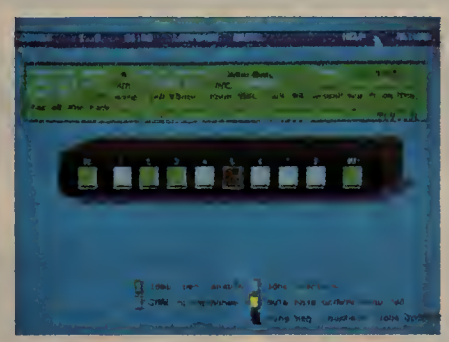
Mix and match media to meet your cabling requirements. Add additional SMAUs to your ring by using UTP, STP or the built-in Fiber Ring Option which extends the ring to 7500 feet between SMAUs.

No more guessing where faults have occurred by playing "pull the connector" to restore your network! GTI's SMAU is smart enough to automatically restore your ring and inform you where to fix it.

GT16 Network Series comes equipped with an RS232 and two RS485 interfaces. The RS232 allows local communications via the network manager's work station, or remote communications via a 2400 baud modem. The out-of-band interconnection of the SMAU is via the RS485 interface over inexpensive Type 3 cable.



GLOBAL STATUS



LOBE STATUS

SMART-VIEW

Network Management Software offers centralized control and management of the physical layer of the Token Ring Network via a detailed real-time graphic display. SMART-VIEW provides global and real-time alarm status with trouble tickets which identify fault location to speed-up repairs, and also provides a variety of reports to complete the human interface.

SOFTWARE FEATURES:

- Provides Network Management
- Control and Status for 31 SMAUs
- Runs on PC or PS/2
- Mouse or Cursor Operation
- Monitors Ring and Lobe Status
- Co-exists with other software
- Provides User List and Data Base
- Real-time Alarm Status and Trouble Ticket
- Controls Insertion or Lock-out of Lobes
- Controls Ring Configuration and Wraps
- Provides Alarm Log and Reports
- **DEMO DISK AVAILABLE**

GENERAL TECHNOLOGY INC.

SMART MAU, SMAU and SMART-VIEW are trademarks of General Technology, Inc. PATENTS APPLIED FOR - copyright© 1989, 1990 and 1991 General Technology, Inc. - All rights reserved.

415 Pineda Court, Melbourne, FL 32940 407-242-2733 Sales: 800-274-2733 FAX: 407-254-1407

PC Expo

Special PC Expo Show Issue - June 24

Closes: June 12th

Bonus Distribution

Call for further information on advertising in this Special Issue.

1-800-622-1108
(In MA): 508-875-6400

Network Computing Forum

Special Network Computing Forum Show Issue - July 15

Closes: July 3rd

Bonus Distribution

Call for further information on advertising in this Special Issue.

1-800-622-1108 (In MA): 508-875-6400

ICA

Special ICA Show Issue - June 3

Closes: May 22nd

Bonus Distribution

Call for further information on advertising in this Special Issue.

1-800-622-1108 (In MA): **508-875-6400**

SEMINARS

1991 ICA Summer Program

LAN - WAN - LAN

Design - Connectivity - Management

June 23 - 28, 1991
University of Colorado at Boulder

The Problem
As corporations and technology move into the 1990s, *local area network* (LAN) traffic will have the largest, single effect on *wide area network* (WAN) traffic, and will force an increase in the communications capacity of most major corporations.

The Solution
To help communications professionals and managers meet this challenge, ICA has assembled a distinctive educational program that offers:

- ▲ Exposure to leading-edge LAN-WAN-LAN operating systems, applications, management and policy issues, and hands-on laboratory experiences
- ▲ Presentations by our industry's best consultants and academicians
- ▲ A superb learning environment in an academic setting

For a free brochure, call or write:

International Communications Association
12750 Merit Drive, Suite 710, LB-89
Dallas, Texas 75251-1240
1-800-ICA-INFO or Fax: 214-233-2813

INTERNATIONAL COMMUNICATIONS ASSOCIATION

COMPUTERS

The HAST Solutions

Starter Solution
AT-286 12 MHz System

- 80286/12 MHz
- 640K Memory
- 40 MB Hard Drive
- 101 Keyboard
- 1.2 MB 5.25" or 1.44 MB 3.5" floppy
- 12" mono monitor
- 200W power supply

$599

14" VGA Color Monitor Upgrade **$285**

Big Solution
AT-386 25 MHz System

- 80386/25 MHz
- 1 MB Memory
- 40 MB Hard Drive
- 101 Keyboard
- 1.2 MB 5.25" or 1.44 MB 3.5" floppy
- 2 serial, 1 parallel ports
- Real time clock w/ battery backup
- VGA card
- 14" VGA monitor
- 200W power supply

$1499

Roll Your Own Solution

AT-286 Barebone System

- 80286/12 MHz
- 1 MB RAM
- OAK VGA card
- 1:1 IDE card
- 200W power supply

$280

Options:

40 MB IDE HDD	$210
1.44 MB FDD	$ 55
DR DOS	$ 59

One year warranty
All Systems Network & Unix Compatible
24 Hr Online BBS (516)689-3036

HAST Ltd. 2781 Brower Ave Oceanside, N.Y. 11572 800-253-7922 or FAX 516-678-9430

TRAINING

WAN/LAN Seminars from Kaptronix

Peer-to-Peer SNA/SAA: APPC/LU 6.2, PU 2.1, APPN, CPIC Architecture, operation, design, ...

IBM Token Ring: Operation, Bridges, Routers, SNA Gateways, Network Management, ...

FDDI: Basics, Design, Operation, Implementation, Alternatives, ...

In June and July:
● NY/NJ ● Houston ● Wash-DC

For details, call (201) 769-4250

12 Years of excellence in education

TELEtutor

COMPUTER-BASED TRAINING

LAN
X.25
T1

FOR **FREE** CATALOG OF ALL OUR COURSES
CALL
1-800-542-2242
(603) 433-2242

TeleCommunications Training Monthly

VIDEO TAPE TRAINING

- X.25 Protocol Analysis
- SDLC/SNA Protocol Analysis
- ISDN BRI "The Basics"
- Switched Telephone Circuit Basics
- T1-Carrier
- Network Topology
- Local Area Network Protocols
- DataCom Concepts (RS-232-C)
- Analog Line Measurements
- Digital PBX
- Digital Voice Encoding

Call for Demo Tape
(215) 598-3293

Reminder:

The May 13th Issue

Closes May 1st

Reach proven buyers affordably - in Network World's Networking Marketplace!

Whether you're buying or selling networking products and services, the **Networking Marketplace** pages of **Network World** are your most cost-effective advertising vehicle. **Network World** is the only networking newsweekly that reaches 150,000 volume buyers of networking products and services. This means that **Network World** is a natural medium for your product classified advertisement.

Your ad can run under the subheadings of Data Communications, Telecommunications, LANs, Seminars, Training, Software, Consulting Services, PCs and more.

To place your space in the **Networking Marketplace**, call Joan Bayon Pinsky, Director/Product Classified Advertising or Clare O'Brien, Account Executive at 1-800-622-1108 (in MA, (508) 875-6400) today!

NETWORKS

$ $ SAVE $ $

"TAKE ADVANTAGE OF OUR NETWORK NODES"

NODAL FACILITY MANAGEMENT SERVICES

- TURNKEY FACILITIES
- TRAINED STAFF
- TEST EQUIPMENT

Rack Space available in following cities:

Boston	*Houston*	*San Francisco*
Chicago	*London*	*Singapore*
Denver	*Los Angeles*	*Tokyo*
Frankfurt	*Miami*	*Toronto*
Hong Kong	*New York*	*Vancouver*
Honolulu	*Paris*	*D.C./Alex., VA*

International Telecommunications Services

its

(516) 589-8666 Sales

Buy, Sell Or Announce Through Network World's Classified Section

Buying or selling communications-related products or services?

Or do you want to announce an upcoming event or business opportunity?

If so, Network World's classified section is the right choice for you.

You'll reach more than 150,000 communications/ networking professionals all of whom are buying decision makers.

And you'll reach them every week.

Find out just how effective and cost efficient Network World classified advertising can be.

For all the facts write or call: Network World, Classified Advertising

Joan Bayon Pinsky, 161 Worcester Rd, PO Box 9172, Framingham, MA 01701-9172; 800-622-1108 (in Mass., 508-875-6400)

Pacific & Mountain time zone advertisers contact Clare O'Brien at above address and telephone.

10Base-T Networking

We Connect the Dots

Q N E T™

Installing and expanding Ethernet just got a whole lot easier. In fact, the Q-Net™ 10Base-T system for unshielded twisted pair wiring (UTP) makes it as simple as connecting the dots. With Q-Net, thick and thin coax is replaced with UTP, the media of choice for computer and LAN communications. And, as you grow, Q-Net grows with you, keeping you on line from point to point. With a variety of features including maintenance, diagnostics, monitoring and network management software, Q-Net is the 10Base-T solution for you.

Is your network a puzzle? Call Computer System Products, we'll get you connected.

Computer System Products INCORPORATED

1-800-4-CABLES

14305 21st Avenue North, Minneapolis, Minnesota 55447 FAX 612-476-6966

Interested In Advertising In Network World's Networking Marketplace?

We Have Sections For:

Telecommunications Equipment
Datacommunications Equipment, Bids & Proposals, Computers, Consulting Services, Real Estate, Seminars, Software, Training

Call Or Write: **Network World**

Joan Bayon Pinsky, 161 Worcester Rd, Box 9172, Framingham, MA 01701-9172; 800-622-1108 (In MA 508-875-6400)

Pacific and Mountain time advertisers contact Clare O'Brien at above address and telephone.

UNIQUE EDITORIAL

Every week, *Network World* provides information that helps users who design, purchase and implement enterprise networks.

Network World's Weekly Coverage

* News
* Industry Updates
* Telecommunications
* Data Communications
* Local Networking
* Management Strategies
* Products and Services
* Buyer's Guides/Features
* International Networks

Enterprise networking is the driving force in today's end user market and the driving force of *Network World's* editorial.

The Wang Institute of Boston University presents

NETWORKS FOR THE '90'S

Entering the New Era of Data Communications

May 15-17, 1991
Boston, MA

Keynote Addresses

You will be able to attend keynote addresses by the experts in the field. William Stallings will deliver a talk on Key Trends in Networking, while Mischa Schwartz will discuss the present and future of Telecommunications Networks.

Exhibits

An exhibit hall and product demonstrations of the newest developments will allow you to get straight answers to your product specific questions.

For complete conference details, please call
(508) 649-9731
or write
Wang Institute of Boston University
72 Tyng Road
Tyngsboro, MA 01879

Respond to the Challenge of Networking in the '90s

Tutorials

All tutorials are presented by industry experts. These acknowledged leaders in their fields will address the practical issues that concern you the most. You will learn from the innovators and developers in the data communications community.

Choose from topics such as:

- Gigabit Networks
- X.400
- Digital Services and SONET
- The Transition from TCP/IP to OSI
- High-Speed Wide Area Networks
- Frame Relay Technology
- Internetworking

OSI and GOSIP Product Analysis and Planning Guide 1990-1993

A Network World/ Mier Communications Report

OSI and GOSIP product strategies for over two dozen top vendors, including DEC, H-P, IBM, AT&T, NCR, Sun and others.

*Vendor interoperation analysis
*Product customization and configuration needs
*GOSIP compliance needs
*X.400 and FTAM support
*Price trends

Single copy price: $695
VISA, MasterCard or money orders

CONTACT:
Cheryl Tynan
Network World Special Reports
161 Worcester Road
Framingham, MA 01701
(800) 622-1108, in MA (508) 875-6400

NETWORKING CAREERS

Network Design Engineer

Sargent Fiber Optic Services is increasing its participation in the network and systems integration market. Sargent offers an exceptional opportunity for a highly motivated network design engineer. The position requires experience and expertise in:

*** Network planning and design**
*** Network implementation**
*** Protocol architectures**
*** PC Network Operating Systems**
*** Workgroup concentrators, bridges, routers, and gateways**

The candidate should have 3-5 years of network design and implementation experience. Project management experience in organizing a staff, utilizing subcontractors, and procuring equipment from vendors is highly desirable. We offer competitive salary and benefits. Qualified candidates should send resume to:

Sargent Fiber Optic Services
A Division of Sargent Electric Company

Sargent Fiber Optic Services
2801 Liberty Avenue
Pittsburgh, PA, 15222
Attention: John D. Sargent
V.P. - Engineering

PROFESSIONAL RESUME SERVICES
Successfully servicing networking professionals.
All levels and specialties. Effective! Confidential, creative. We provide resume preparation, cover letter development and career planning. Ongoing advice & support to clients throughout job search. Immediate service available.
1-800-933-7598
(24 hrs.),
Alan Kirschen, M.A.

Recruit The Best !

Network World reaches over 150,000 highly qualified networking and communications professionals every week !

To place your ad or to receive a copy of our *Networking Careers* media kit, call Bill Reinstein, National Sales Director, *Networking Careers* toll free at 800-622-1108. (in MA 508-875-6400)

Networking Careers On-Line

A new, free service for **Network World** readers interested in career opportunities!

Networking Careers On-Line gives networking and communications job seekers a new way to learn more about career opportunities advertised in **Network World.**

This new service, available through **Network World's On-Line Bulletin Board System,** was designed to provide you with the information you need to keep abreast of current opportunities and make informed career decisions.

Here's what you'll see:

▲ The full text of an entire month's worth of **Networking Careers** employment opportunities.

▲ Additional valuable information to educate you about company corporate backgrounds and current needs.

▲ The **Networking Career Forum** where **Network World** readers share information and advice about career opportunities and employment-related subjects.

And, it's this easy to use:

▲ **Networking Careers On-Line** can be accessed 24-hours a day on the **Network World Bulletin Board System (BBS).** From any computer and modem, simply dial 508-620-1160 [300-2400 Baud (8-N-1)], or 508-620-1178 [up to 9600 Baud (8-N-1)] today!

Find out more about today's exciting networking career opportunities with **Networking Careers On-Line!**

NETWORKING RESOURCE DIRECTORY

Network World's Resource Directory is a service for both our advertisers and our readers. The Resource Directory is updated monthly to be the most comprehensive listing of networking products and services available anywhere. With over two hundred categories to choose from, you can place your company under the most appropriate headings to make it easily accessible to 150,000 buying decision makers of networking products and services.

All rates for listings are sold on a 26-week basis and are net priced for that period. A line listing is company name and telephone number.

Display listings are also available in four sizes. A display listing consists of copy of your choice.

Line Listing Rates (prices are net for 26-week period)	
Company listing	$500.
2-9 additional listings	$450. per listing
10 or more additional listings	$400. per listing
Bold listing — extra	$ 50. per listing

Display Listing Rates (prices are net for 26-week period)	
2 5/16″ wide x 1/2″ deep	$1,000.
2 5/16″ wide x 1″ deep	$2,000.
2 5/16″ wide x 1 1/2″ deep	$2,800.
2 5/16″ wide x 2″ deep	$3,600.

Space and copy closing for next updated issue is April 25. Listing begins in May 20 issue and runs through the November 11, 1991 issue.

For more information or the list of headings, call Eleni Brisbois, Resource Directory/Project Manager at 1-800-622-1108 or 508-875-6400.

To place your listing call 1-800-622-1108 or fax 508-651-1853 or mail your order to *Network World,* Eleni Brisbois/Resource Directory, 161 Worcester Road, Framingham, MA 01701-9172.

Computers/Peripherals

Memory Upgrades

MEMORY UPGRADES
IBM, COMPAQ, AST, DEC, EPSON, HP NEC, SUN, TOSHIBA, ZENITH, Others
5 Year Warranty - Immediate Delivery!
Σ SIGMA DATA
Established 1980
New London, New Hampshire
CALL FOR OUR PRICE LIST
800 446-4525

Data Communications

Acoustic Couplers
Glasgal Communications, Inc...201-768-8082

Diagnostic Test Equipment
Analog Line Testers
GN Navtel.....416-479-8090

Cable/Interface Testers

LAN Cable Testers
● Twisted Pair ● Coax ● Fiber ●
Cable Troubleshooting & Certification
- TDR, Length, Noise, Attn., XTALK, Line Map
- Fast, Easy, One Button "Auto Test"
- Automatic Printout of Test Results
- 10BASE–T, Token Ring, Ethernet, ARCNet, FDDI, and More

Outside California: 1-800-854-2708
Within California: 1-800-227-9781
Beckman Industrial™ An Affiliate of Emerson Electric Co

Glasgal Communications, Inc...201-768-8082
GN Navtel.....416-479-8090

Error-Rate Measurement Equipment
Glasgal Communications, Inc...201-768-8082
GN Navtel.....416-479-8090

Performance-Measurement Equipment
Glasgal Communications, Inc...201-768-8082
GN Navtel.....416-479-8090

Protocol Analyzers

SNA 3270/LU6.2 Tests
- 3800 + Validation & Load Tests
- SDLC and Token-Ring • PC-Based
- Specs and Source Coding Provided

Applied Computer Technology
Garland, TX (214) 271-6550

Protocol Analyzers cont.
Azure Technologies.....800-233-3800
Glasgal Communications, Inc...201-768-8082
GN Navtel.....416-479-8090

TEST YOUR NETWORK WITH THE BEST
OUR PROTOCOL ANALYZERS
* Test Networks at Higher Speeds
* Are Easier to Use with EASY-VIEW℠
* Are More Powerful and Flexible
* Test ISDN, T1, SS#7, SNA, X.25,...
TELENEX CORPORATION CALL 1-800-368-3261
AR Diagnostic Products

Protocol/Interface Simulators
GN Navtel.....416-479-8090

T-Carrier
Electrodata, Inc. 800-441-6336
Glasgal Communications, Inc...201-768-8082

DSU/CSU
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Kentrox T1 CSUs - low wholesale prices.
Configuration & diagnostic service via modem.
Koenig Com. - *T1 Specialists* 800-786-9929

Modems

Limited Distance/Line Drivers
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

High Speed (9.6kbps+)
Eastern Datacomm, Inc.....201-262-9022
Glasgal Communications, Inc...201-768-8082

Fiber Optic
Canoga-Perkins Corp. 818-718-6300
Glasgal Communications, Inc...201-768-8082

Multiplexers
Fractional T-1

AYDIN CONTROLS
MULTIPLEXERS AND 4:1 and 2:1 DROP/INSERT TRANSCODERS
- Full and Fractional T1 Rates
- Toll Quality Voice High Speed Data
- Handles 9 6 Kbps Modem and Group III FAX

Call 1-800-366-8889
414 Commerce Drive • Fort Washington, Pa 19034-2602

Fractional T-1 cont.
Glasgal Communications, Inc...201-768-8082

Optical Fiber
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Statistical
Eastern Datacomm, Inc.....201-262-9022
Glasgal Communications, Inc...201-768-8082

Time Division
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

T-1
Anixter.....800-232-0190
Canoga-Perkins Corp. 818-718-6300
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

Network Management Systems
Glasgal Communications, Inc...201-768-8082
Micro Technology.....714-970-0300
Telenex-AR Prod. 800-368-3261
Telenex-Spectron Prod. 800-222-0187

Patching Equipment
Glasgal Communications, Inc...201-768-8082
Telenex-AR Prod. 800-368-3261
Telenex-Spectron Prod. 800-222-0187

Switches
Data
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082
Wise Components Inc.....800-543-4333

Matrix
Datacomm Mgmt Sciences.....203-838-7183
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082
Telenex 800-222-0187

Packet
Glasgal Communications, Inc...201-768-8082
OST, Inc. 703-817-0400

Port Selectors
Eastern Datacomm, Inc.....201-262-9022
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

Use Network World's Resource Directory every week to buy or sell networking products and services.

Systems Integrators
Glasgal Communications, Inc...201-768-8082

LAN UNIX X.25 SQL
SBT
StonyBrook Technologies, Inc.
(516) 567-6060 GSA Contractor
NOVELL MICROSOFT
DCA EICON EDA SCO
PRODUCT SUPPORT SERVICE

Terminal Servers
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

Local Area Networks

Bridges
Anixter.....800-232-0190
Canoga Perkins 818-718-6300
Glasgal Communications, Inc...201-768-8082

Netronix.
The Second Generation Of Ethernet and Token Ring Bridges. 1-800-282-2535
Netronix Technology That Works.

LAN/WAN Bridges
Glasgal Communications, Inc...201-768-8082

Brouters
Glasgal Communications, Inc...201-768-8082
RAD Data Communications Inc. . 201-587-8822

Gateways
Glasgal Communications, Inc...201-768-8082

Installation Services
Glasgal Communications, Inc...201-768-8082

Local Area Networks
Broadband Based
Anixter.....800-232-0190

Ethernet Compatible

ANIXTER
Wiring Systems Specialists
Voice • Video • Data • Power
digital™
Authorized Distributor
800-232-0190

NETWORKING RESOURCE DIRECTORY

Ethernet Compatible cont.
Glasgal Communications, Inc...201-768-8082

Fiber Optic Based
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Token Ring
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

10BaseT Systems
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

CALL THE CONNECTIVITY EXPERTS
• David Systems • Proteon
• Startek • DAMAC
• Allied Telesis • Others
• Network Application Technology
Westech Communications, Inc
28310 Industrial Blvd, Suite K
Hayward, CA 94545 (415)887-8773

LAN Test/Management Devices
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Routers
Glasgal Communications, Inc...201-768-8082

Security

Dial Back Systems
Equinox.....305-255-3500
Glasgal Communications, Inc...201-768-8082

Software

Cable Management
Glasgal Communications, Inc...201-768-8082
Network Facilities.....612-934-2655

EMail/Messaging
Notework Corporation 800-767-6683

E-Mail Gateways for Macintosh
StarNine Technologies (415) 548-0391
2126 6th St. Berkeley, CA 94710

Micro-to-Mainframe
StonyBrook Technologies, Inc..516-567-6060

Network Management
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

NetAlarm NetWare Monitor TSR
"Smoke Detector" for NetWare
Meyer & Associates 415/277-1975

Objective Systems Integrators....916-989-7340

Structured Wiring Systems

Baluns
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

TIEX
TWISTED-PAIR WIRING SPECIALISTS
for
IBM AS/400, S/3X, TOKEN RING, 3270
800-533-TIEX
fax 214-385-0723

Cables
Coax
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Fiber Optic
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Twisted Pair
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Connectors
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

MOD-TAP®
Total Wiring Solutions from YANKEE
1-800-365-9720 FAX: 603-625-4915

Cross Connect Blocks
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Wiring Concentrators
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Support Equipment

Power Distribution/ Equipment Protection

UPS Supplies

EXIDE ELECTRONICS
5608 Spring Court, Raleigh, NC 27690-0457
800-554-3448 fax: 800-75-EXIDE

Support Services

Consulting
General Network Service Inc 203-327-2322

MULTI-TECH COMMUNICATIONS, INC.
VOICE * DATA * LAN
CALL 201-627-2518

PRISM TECHNOLOGY INC.
NetWare 386/286 Consulting
Client/Server Applications
Sales & Installation
NOVELL AUTHORIZED RESELLER
(617) 241-0451
LAN Manager

NOVELL SERVICE
SUPPORT & CONSULTING
(408) 559-7367

Educational Training Services

IBM: SNA/APPC/CPI-C
Galaxy Consultants.....408-354-2997

Lease/Resale Organization
Marketex-Leasing Services.....408-241-3677

Telecommunications/ Voice

Centrex

CENTREX SYSTEM?

CONSOLE YOURSELF WITH TONECOMMANDER
A family of answering consoles. Please call: 1-206-883-3600 1-800-524-0024

For whatever you sell from A to Z, you should place it under a heading in Network World's Resource Directory.

Fax Processing Systems
Biscom.....800-477-2472

Fax with FAX-LINK
Easily fax WP, PO's, Quotes, Etc. from any terminal.
PHONE: 409-762-2886 Intuitive Technology Inc. FAX: 409-765-7073

ISDN Products
Anixter.....800-232-0190
Glasgal Communications, Inc...201-768-8082

Space and copy closing for June 17 issue is May 23.
Listing runs through the December 9 issue.

Transmission Services

Microwave

FCC Licensed Digital Microwave
Carrier • Bypass • Alternate Access
• Disaster Recovery/Diversity
(212) 509-5115 LOCATE
17 Battery Place, Suite 1200, NY, NY 10004

VSAT
GTE Spacenet Corporation 800-535-5375

Network World Second Quarter 1991 Editorial Features

April 15

Standards update

April 22

Buyer's Guide: Interexchange carrier digital private-line services
Special: Lead Service

April 29

Twisted-pair networks

May 6

Buyer's Guide: X.25 packet switches
Show Distribution: Dexpo South
Special: Harvey

May 13

Trends Reshaping Networks: Security
Special: Lead Service

May 20

Virtual networks update

May 27

SNA Update

June 3

1. Buyer's Guide: Bridges/routers
2. Survey: Critical issues facing users
Show Distribution: ICA
Special: Lead Service

June 10

Buyer's Guide: Bypass equipment

June 17

Voice processing

June 24

Buyer's Guide: SNMP management tools
Special: Lead Service

(continued from page 29)

feet, or they can employ more flexible thin-wire coaxial for up to 610 feet. The IEEE's 10BaseT specification mandates two unshielded twisted-pair cables and a distance of no more than 100 meters (about 328 feet) between any two transmitting points — workstations, repeaters or active hubs in a wiring closet.

For campus networks, therefore, 10BaseT is not used over unshielded twisted pair. For longer distances, 10BaseT hubs employ an interface to coaxial cable or fiber. At most user sites, however, 100 meters over unshielded twisted-pair segments is considered adequate to let users reach their nearest telecommunications wiring closet.

The FCC sets rules to prevent that from happening. But according to Bill Aranguren, a development supervisor with AT&T Computer Systems, the FCC's current emission test policies and procedures are very vague. It is left up to manufacturers of 10BaseT equipment to determine on their own whether their systems' electromagnetic emissions are within acceptable limits.

However, a new FCC emissions test procedure, which will take effect in June 1992, includes much more specific — and stringent — measurement requirements. According to Aranguren, several 10BaseT hub products now on the market would not pass these new test guidelines. (Because these allegations could not be independently confirmed, it was decided not to list the name of those products.)

Aranguren also raises the issue of whether any large 10BaseT network employing unshielded twisted pair is possible using a single active hub. "I question whether any [manufacturer of hubs or concentrators] with 100 or more ports and that measures in accordance with the new procedure could pass [the new FCC requirements]," he says.

Unshielded token rings

If electromagnetic emissions from twisted-pair LANs are excessive at the 10-MHz signaling rate of 10BaseT, they are likely to be worse at the higher signaling frequency of a 16M bit/sec token ring. It is mainly for this reason that IBM does not endorse operation of 16M bit/sec token rings over unshielded twisted-pair wire.

In the mid-1980s, four years before unveiling the 16M bit/sec token ring, IBM specified what is now known as IBM Type 1 cable for data rates of 16M bit/sec and higher — actually, for rates up to the 100M bit/sec range. In diameter and weight, Type 1 more closely resembles the coaxial cable used in 3270 terminal networks than the more familiar telephone twisted-pair wiring.

Type 1 consists of two pairs of twisted, solid 22-AWG copper conductors, surrounded by a metal shield, all encased within a polyvinyl chloride jacket.

(continued on page 57)

The possibility exists that some 10BaseT installations may be emitting too much electromagnetic energy.

▲▲▲

The 10BaseT specification doesn't recommend any particular type of twisted pair. Even old, already-installed analog phone wiring — usually 24 American Wire Gauge (AWG), but sometimes the smaller 26 AWG — is considered usable. However, to be on the safe side, it is best not to attempt 10BaseT over pairs that may have lost their twists.

Regardless of the gauge of twisted-pair wire used, the node-to-hub segment should support the specified bit error rate of 10^{-9}; 10BaseT calls for an end-to-end system bit error rate of 10^{-8}.

The possibility exists that some 10-BaseT installations may be emitting too much electromagnetic energy in the form of radio waves. A fundamental problem of LANs is that at high data rates, with even moderately low electrical power, unshielded wiring turns into a broadcasting antenna. To avoid that, new higher speed LANs that rely on unshielded twisted pair reduce signal power even more, requiring increased receiver sensitivity but also usually decreasing distances.

Despite that, some experts believe that — depending on the type of unshielded twisted pair and the connectors and hubs used — some 10BaseT installations may be emitting excessive electromagnetic radiation.

Now If You Want To Run A 10 BaseT Ethernet System, You'll Just Have To Spend Less.

Introducing Du Pont's LAN ONE With 10BaseT. The Affordable Standards Conformant System.

Why spend up to four times more for LAN hardware that can handle 10BaseT Ethernet and even fiber optic Token Ring within one system?

Du Pont's new LAN ONE 10BaseT System will do it for much less. In about half the space.

Just 6½" high, the LAN ONE Universal Concentrator cuts wiring closet space by nearly 50%. And when configured as a 100% twisted pair system, up to 60 Ethernet nodes can be interconnected on a single concentrator.

LAN ONE 10BaseT is also extremely versatile, thanks to "standards conformant" modules that interface with other "standards" hardware, giving you more choices when expanding your LAN.

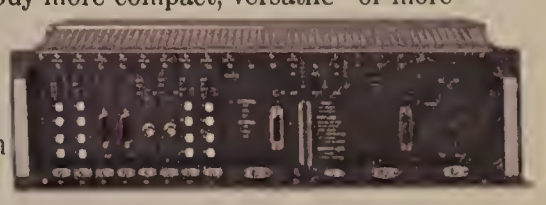
And here's another cost-saving feature. Instead of separate concentrators for each protocol, LAN ONE runs Ethernet (using twisted pair, fiber optic or coax cabling) and fiber optic Token Ring (in both 4 and 16 Mb/s versions) concurrently within a single Universal Concentrator.

Equally important, Du Pont LAN ONE hardware is designed for modularity. Our new products are always compatible with the old. Equipment enhancements can be made at minimum expense. And different LAN types can be added or dropped without making your concentrator obsolete.

To learn more about LAN ONE from Du Pont, a leader in LAN systems since 1982, send for our free brochure. Just call **1-800-888-LAN1** or **1-919-481-5100.**

Or write: Du Pont Electronics, Electro-Optic Products,* P.O. Box 13625, Research Triangle Park, NC 27709.

You can't buy more compact, versatile—or more affordable—LAN hardware to run both 10BaseT Ethernet and Token Ring within a single system.



* Formerly Siecor Electro-Optic Products

Du Pont Electronics
Share the power of our resources.

DU PONT

Editorial Excellence Confirmed. Again.

NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 7, Number 23 — An International Data Group Publication — June 4, 1990

Unisys set to unveil X.500 plans, tools

By Paul Desmond, Senior Editor

BALA BYLL, Pa. — Unisys Corp. is scheduled to announce this week X.500 Directory Services (DS) software for its Unix-based multiuser systems and plans to port the software to its mainframe and workstation operating systems.

The Unisys DS software will enable users to build centralized or distributed directories that make it easier to support a range of applications, such as file transfer and electronic mail, across sets of disparate Unisys computers.

Eventually, Unisys DS will allow users to link their X.500 directories to X.500 implementations on different vendors' equipment, letting users build a single distributed global directory for a variety of Open Systems Interconnection applications.

X.500 is an OSI standard for creating directories that contain the network addresses and full names of various network objects, including electronic mail boxes, computers, applications and files. It lets users key in simple names to manage users or access files, instead of requiring the users to know the whereabouts and formal network names and ad-

(continued on page 73)

When is diverse network routing not really diverse?

When multiple carriers lease capacity on the same fiber or separate fibers in the same cable trench.

By Bob Wallace, Senior Editor

The recent rash of long-haul carrier fiber cuts — three in less than two days — has demonstrated the need for diverse routing in corporate networks and, more importantly, the need to ensure that backups beyond fresh multiple carriers actually follow different paths.

Carriers lease capacity on one another's networks, making it difficult for users to determine if their nets are fail-safe. One fiber or multiple fibers in the same trench, for instance, may represent a single point of failure for multiple carriers.

A great number of users are under the mistaken impression that they have route diversity because they use more than one carrier for service between two points, said Henry Hafke, group director of telecommunications and application systems for Ryder Systems Inc. in Miami.

On May 10, for example, a New Jersey utility crew on a north-

(continued on page 75)

DEC offers document mgmt. for DECnet

Plan would let users better manage compound documents consisting of text, images, graphics.

By Jim Brown, Senior Editor

BOSTON — Digital Equipment Corp. last week introduced its Document Management plan for helping DEC net users manage the creation, storage and retrieval of compound documents containing text, images and graphics.

The plan combines existing DEC products with client/server applications from four vendors, making it possible for users to create compound documents in data bases throughout a network and review the documents as the data elements used to create them are changed.

Document Management is a step above traditional file management, in which data elements

DEC offers EDI software, services. Page 4.

used to create compound documents are managed separately.

Document management is a vital part of networking, said Craig Cline, associate editor of the "Seybold Report on Publishing Systems," an industry newsletter in Malibu, Calif. As companies store more documents electronically, they need tools to manage them, he said.

DEC said products conforming to its Document Management plans will be based on its Compound Document Architecture (CDA), a key component of which is its Digital Document Interchange Format (DDIF). CDA is modeled after Open Systems In-

(continued on page 73)

U·S·E·R ADVISORY PANEL

NW's User Panel speaks out on ISDN

By John Gallant, Editor

In an informal survey, members of Network World's User Advisory Panel discussed their views on Integrated Services Digital Network, as well as their plans for implementing the much-debated technology.

Panel members said ISDN will not play a key role in their network strategies in the immediate future and expressed concern about the slow deployment of ISDN services in the local loop.

In addition, members of the panel voiced concern about the cost of ISDN products and services, as well as incompatibilities among different vendors' ISDN equipment (see related story to left).

Network World's User Advisory Panel comprises top network executives from companies in a range of industries and representatives of leading users groups, including the Association

(continued on page 72)

NETLINE

NOVELL CUTS USERS IN on the enhanced features of its latest NetWare 386. Page 2

ANT'S FUTURE SHAKY after court finds Pennsylvania Bell's cable TV service illegal. Page 2

LURED USERS NOTE strengths and weaknesses of using ISDN BRI to link LANs. Page 2

USERS ARE GROWING wary of dealing with service aggregators as carriers classify them as rivals. Page 4

JUSTICE DEPT. heads back into court for divestiture Consent Decree. Page 4

MERRILL LYNCH STEPS up its partnership as its Telerate unit in fund the expansion of network bypass facilities into major cities. Page 76

NEWSPAPER

FEATURE

Top ISDN switches lack mutual compatibility

By Edwin Mier, Special to Network World

AT&T and Northern Telecom Inc. are building their ISDN-compatible central office switches from widely differing sets of blueprints. The two switch makers dominate the embryonic U.S. Integrated Services Digital Network market, so the differences in these ISDN implementations deeply concern users who hope "plug and play" will be the hallmark of the brave new ISDN world.

Users should be aware of the following issues.

- All the several hundred features implemented in the ISDN software of both AT&T's and Northern Telecom's switches, fewer than 25% have been defined to standard and implementation-specific-

(continued on page 42)

In February of 1991, attendees of the **Communication Networks '91** conference voted **Network World** their most regularly read publication among over 200 other industry publications. This is the fourth consecutive year ComNet attendees gave this response to the Exhibit Survey's unaided readership question.

What's more, in both 1990 and 1988, members of the International Communications Association (ICA) voted **Network World** their most important/useful networking publication in the ***Wall Street Journal/* Erdos & Morgan** study. Study after study, our editorial excellence speaks for itself.

That's what we call readership leadership.

NETWORK WORLD

Because The Network Is Everything.
An IDG Publication

DEC set to haul in DECnet V

By CARL MALAMUD

Say hello, wilkommen, bienvenue to multilingual protocol stacks.

Like IBM with its Systems Application Architecture, Digital Equipment Corp. has made a major corporate commitment to an architecture that it hopes will conquer the future.

The new architecture, DECnet/OSI Phase V — which DEC has been working on for more than two years — aims not only to continue connectivity with DEC's existing products (which currently use DECnet Phase IV), but also to provide interconnectivity with Open Systems Interconnection-compatible systems.

Those are its intentions. But the real test of Phase V will be if future DEC products achieve this grand vision of interoperability.

DEC is shooting for more than just peaceful coexistence with its competitors. The company's goal is true integration of OSI, Transmission Control Protocol/Internet Protocol and DECnet protocol stacks. DEC wants users to be able to access any service transparently, no matter what kind of network they're on.

OSI compatibility

Phase V's original mandate was to support OSI, hence the new product name — DECnet/OSI. To accomplish that, DEC had to make major changes at all levels of the traditional DECnet protocol stack.

First, the subnetwork technologies, which are defined as data-link services that allow a system to send a packet directly to another system without the intervention of a router, had to be greatly expanded.

In addition to already existing support for Ethernet and DEC's proprietary Digital Data Communications Message Protocol, DEC added support for such international standards as High-Level Data Link Control and the Fiber Distributed Data Interface, as well as increased support for X.25.

Phase V's support for X.25 il-

(continued on page 49)

Malamud is a San Francisco-based author of several books on networks and data bases, including Analyzing DECnet/OSI Phase V, *which is scheduled to be published in August (Van Norstrand Reinholt, New York).*

ILLUSTRATION ©1991 GREG BUSKE

Now anyone can g what kind of b

Microsoft Mail works across all networks.

We too believe that, "The mail must go through." And while sleet, snow and the dark of night may not be your immediate concerns, there are a few other things you should consider.

Like how to connect everything from a small workgroup to an entire organization with one mail product.

Our solution: new Microsoft® Mail.

It'll deliver to anyone's mailbox. Whether that box is a PC running MS-DOS®, the Microsoft Windows™ environment. Or a Macintosh®.

It'll also deliver across all PC networks. Like our own LAN Manager, IBM®, Novell®, AppleTalk® – you get the message.

**Plus shipping, handling, and all applicable sales tax. Offer good while supplies last and only in the 50 United States. In the U.S., call (800) 541-1261, Dept. Q45. For information only: In Canada, call (416) 568-3503; outside the U.S. and Canada, call (206) 936-8661. © 1991 Microsoft Corporation. All rights reserved. Micros*

et mail, no matter ox they have.

And if you already have a mail system on your "big iron," no problem. Everyone can be connected with it, too. Making it easy to send messages, swap documents and boost productivity.

Despite all this power, Mail never treats your PCs like dumb terminals.

One final note.

Microsoft Mail is the only mail system you'll need, because it's designed to grow right along with your company.

To see all the great things that come in the Mail, simply call (800) 541-1261, Department Q45. We'll send you a working model for only $9.95.*

Microsoft®
Making it all make sense™

Microsoft logo and MS-DOS are registered trademarks and Windows and Making it all make sense *are trademarks of Microsoft Corporation. Macintosh and AppleTalk are registered trademarks of Apple Computer, Inc. IBM is a registered trademark of International Business Machines Corporation. Novell is a registered trademark of Novell, Inc.*

Imagine a perfect fit between digital equipment and services.

Imagine the competitive edge you'd gain if your multiplexers were actually "designed to fit" public networks and take full advantage of their services. Imagine your savings if you could combine public carriers' services with your private network to form a hybrid network that increased your flexibility— without the need for costly additional interfaces.

AT&T Paradyne's ACCULINK™ multiplexers were developed specifically to fit public carriers' framing and formatting specifications. Our compatibility makes it easy for you to take advantage of powerful network offerings — like AT&T's ACCUNET® Spectrum of Digital Services (ASDS) for fractional T1, cost-effective Subrate Data Multiplexing (SDM), or BMS-E, for dynamic bandwidth management. And, because ACCULINK multiplexers interoperate with other AT&T Paradyne products, like the COMSPHERE™ 3600 Series DSUs, as easily as with the public networks, you gain the complete digital network solution you need to meet your strategic business goals — from one company.

So if you think the ACCULINK multiplexer sounds like a perfect fit with your requirements, call 1 (800) 482-3333, Ext. 312. In Canada, call 1 (416) 494-0453. For our **free** booklet that describes using ASDS for fractional T1 solutions, call 1 (800) 482-3333, Ext. 313. Or, fax your request to 1 (813) 530-2103.

Now, imagine one company...

AT&T Paradyne

©1991 AT&T Paradyne ACCULINK is a trademark, and ACCUNET is a registered trademark, of AT&T COMSPHERE is a trademark of AT&T Paradyne

(continued from page 45)
lustrates one of the major differences between Phase IV and V. With Phase IV, X.25 could link nodes but only with a permanent virtual circuit. One major disadvantage to that approach was that an X.25 call had to be maintained even if no traffic was going through. That's equivalent to keeping a dedicated telephone line for two people that need to talk only occasionally.

With Phase V, DEC added a feature known as "dynamically established data links." These links allow the network to place an X.25 call only when needed. The call stays in place for a short period of time — say, 30 seconds — in case there is more traffic for that same destination. If there is no more traffic, the call is automatically disconnected by the network.

The biggest change in DECnet/OSI is compatibility with the OSI network-layer protocols. With true OSI compatibility at the network layer, not only are end nodes interoperable, but routers from different vendors can also communicate. Connecting routers allows users to take advantage of dynamic routing, in which topology changes in the network are dynamically discovered by routers. Dynamic routing is a fundamental part of Phase V and a feature that is rapidly progressing toward OSI standard status.

A typical DECnet/OSI Phase V network will isolate networks into domains, each served by one or more routers (see Figure 1 on page 54), which handle traffic inside the domain and serve as a link to other domains. Often, a public network technology such as X.25 will form the bridge between the two routing domains. Other public network technologies, such as Integrated Services Digital Network, Switched Multimegabit Data Service, frame relay or related standards, may be added in the future.

Using the network

Built on top of the transport layer are the three upper layers — session, presentation and application — of the network architecture, which ultimately provide services to end users. DECnet Phase V provides two broad classes of services: proprietary DECnet services and OSI services. Proprietary DECnet services provide backward compatibility and support for features that have not yet been standardized.

DECnet's OSI services provide multivendor interoperability. The OSI platform has standards in a wide variety of areas used to provide services in the network.

(continued on page 50)

What's in a name?

Digital Equipment Corp.'s DECnet Phase IV was limited to 63,000 nodes per network. However, Phase V, with an address space of 20 bytes, has a virtually unlimited number of nodes.

There's a problem, though. How do you find the particular node you want? What about a particular program? What about people to whom you want to send electronic mail?

Naming is a crucial part of DECnet/OSI Phase V. DEC's Digital Network Architecture Naming Service (DNS) allows a user to find the location of a given object on the network. Because the Open Software Foundation has accepted DNS as part of its Distributed Communications Environment, DNS will have a potential impact on many different computing environments.

DNS is known as a primitive naming service: If we know the full name of an object, DNS will give us back a set of the object's attributes, such as its network address. Other attributes can be defined by the users.

For example, an attribute of the object "username" might be a password, allowing the naming service to act as an authentication server.

A higher level of naming is the descriptive service, typified by the international X.500 standards. While DNS requires that the user know the object name, X.500 allows users to locate a user or object name even if it is only working with partial information.

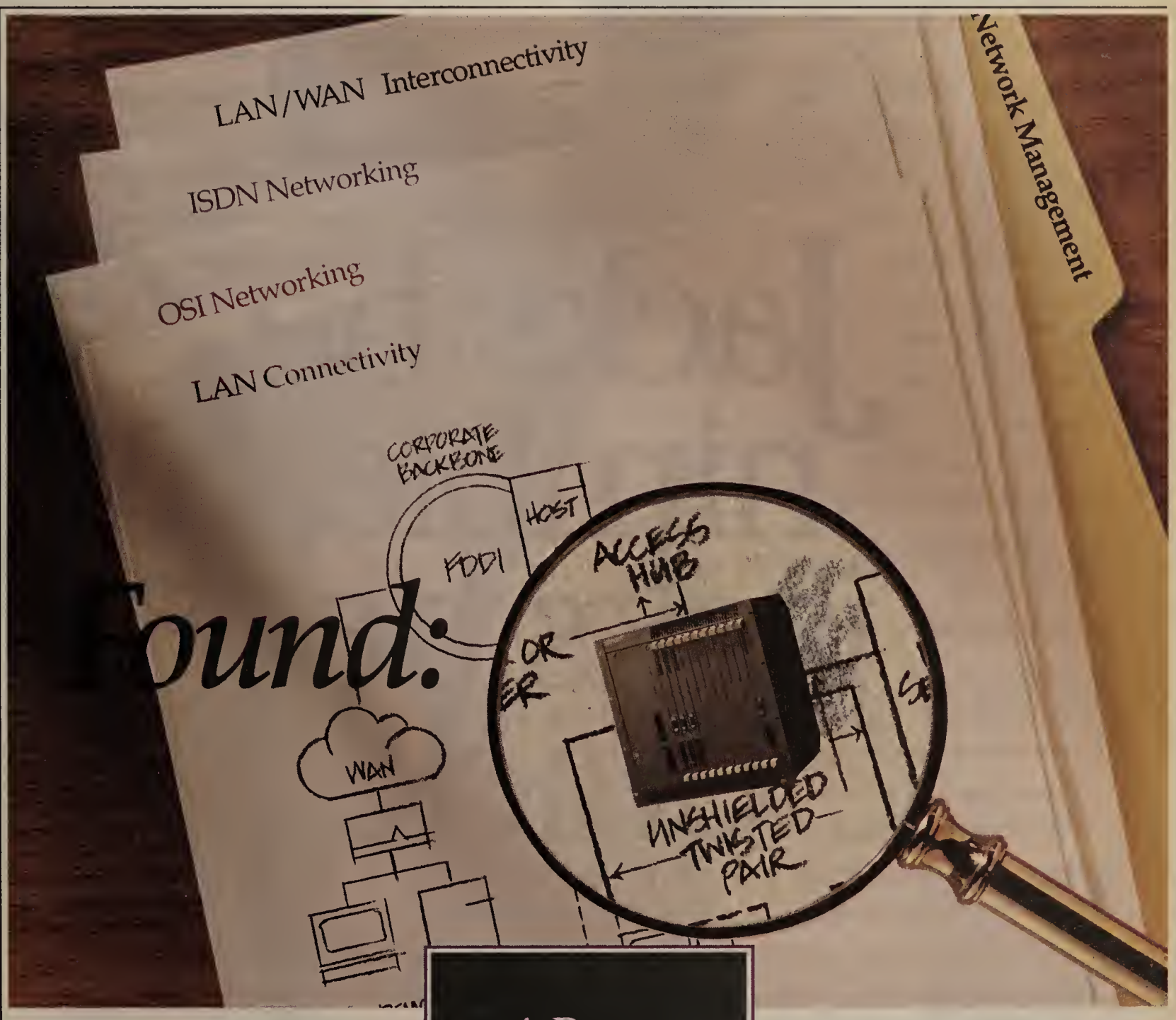
Both X.500 and DNS allow a series of attributes to be returned, for example, the network address. Separating a name from an address allows a service or object to be moved around the network or be offered in several different computers.

Addresses also provide an insulating function. The network layer of the net takes the address and figures out how to get to that particular node. Keeping the address separate from the route used to reach that address allows the network layer to decide among many different paths to an object each time the user requests information about that object.

Thus, a network with all four levels can return a set of attributes such as a network address, find the location with partial information, separate the name from the address, and keep the address separate from the path used to reach that address. All of these naming levels are needed in a network.

With X.500, we can search a global directory to find a unique object name. DNS then allows us to find the location or other attributes of that object quickly. Once we have the address, the network layer will find out how to get to that object.

— Carl Malamud



found.

A Better Networking Solution

Access Hub 132 puts you in control.

Your search for advanced LAN connectivity has just taken a turn for the better. Introducing Access Hub 132, Gandalf's new cost-effective wiring concentrator with integral bridging.

Cost-effective, because you can join a variety of LAN devices with existing unshielded twisted pair wiring using the 10BASE-T Ethernet® standard and its assured interoperability.

Cost-effective, because you can combine sophisticated components into a highly modular system–regardless of the media you choose.

Cost-effective, because you can make fast and easy moves, adds and changes.

Access Hub 132 also features OSI and SNMP network management. As your information systems evolve, Access Hub 132 integrates today's and tomorrow's technologies, offering an ideal building block for future networking requirements.

There's greater productivity and less downtime, with hot-standby power… Distributed Repeater Architecture, a unique method of isolating individual stations without affecting others… plus the ability to change modules without disabling your LAN. And, we back up every Access Hub 132 installation with a responsive nationwide sales and support network.

Access Hub 132. It's everything you should expect from an industry leader offering over 20 years' of proven global communications experience. Call today and help make your network vision a reality: 1-800-GANDALF, EXT. 401

gandalf
Open Networks
for Open Minds

LAN • LAN-WAN • ISDN • OSI • LAN • LAN-WAN • ISDN • OSI • LAN • LAN-WAN • ISDN • OSI • LAN • LAN-WAN • ISDN

Ethernet is a registered trademark of Xerox Corporation.

(continued from page 49)
DEC supports a subset of those OSI standards, such as File Transfer, Access and Management (FTAM) for file access and X.400 for message transfer.

Both OSI and DECnet services share the underlying infrastructure — the physical, network and transport layers — of the network architecture. Access to that infrastructure is provided by each service's distinct session layer. Both session layers can then access the infrastructure to start connections and move data.

While FTAM provides interoperability, a large installed base of DECnet users have programs written to use the Data Access Protocol (DAP) — DEC's proprietary equivalent to FTAM. Although FTAM is a more modern file access mechanism, supporting DAP is important for backward compatibility.

All of the upper layers of DECnet remain backward compatible. For example, the Network Services Protocol, DEC's proprietary transport layer, coexists with the OSI Transport Protocol, and the DECnet session control layer is backward compatible and sits alongside the OSI session control layer.

This simultaneous coexistence allows users to migrate gradually to Phase V. DEC advises users to move a small group of computers to Phase V initially and connect them to the existing network using the backward-compatibility features of Phase V. Then, users can gradually migrate the other nodes over.

Supplementing standards

In several areas, such as time synchronization, remote procedure calls (RPC) and naming services, DEC has chosen not to wait for the standards process, instead providing what it calls value-added services. For example, DEC's Digital Network Architecture Naming Service provides replication of the name space, a service the international X.500 committee is just beginning to address (see "What's in a name?" page 49).

In addition, a variety of other support services are part of the Phase V architecture. A time protocol is used to coordinate the clocks of different computers, a function that is crucial in today's distributed environment. For example, with a distributed data base, if two users are attempting to update the same data, the coordinated timing function ensures that the latest update is the one that takes effect.

RPC is another support standard. DEC has teamed up with the Apollo Division of Hewlett-Packard Co. in the RPC wars. DEC's naming service, together with Apollo's RPC, the Network Computing System, forms the foundation for the Open Software Foundation's Distributed Communications Environment.

The RPC mechanism is crucial in today's distributed networks because it is the programmer's entry point to the network. The programmer designs a collection of procedures that compose a program. The RPC protocols allow the procedures to be moved to different computers, distributing the program into a client/server architecture. Instead of worrying about transport- and network-layer issues, the programmer is able to think in terms of procedures, which is a more natural paradigm.

TCP/IP compatibility

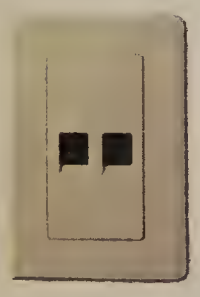
TCP/IP's popularity among users has caught many large vendors by surprise. Many of them were deep into the details of their own computing architectures and didn't think TCP/IP was worth worrying about. Original Phase V plans made no mention of TCP/IP, but during the past year, DEC has reevaluated the role TCP/IP should play in its new architecture.

DEC has long provided TCP/IP support, but as an alternative to DECnet. TCP/IP offerings extend across both VMS and Ultrix operating systems, and even include support for Sun Microsystems, Inc.'s Network File System (NFS). The DECnet-Ultrix Internet Gateway provides application-layer interconnectivity of remote logon, mail transfer and file-transfer services between DECnet proprietary protocols

(continued on page 54)

Jacks be nimble, jacks be quick.

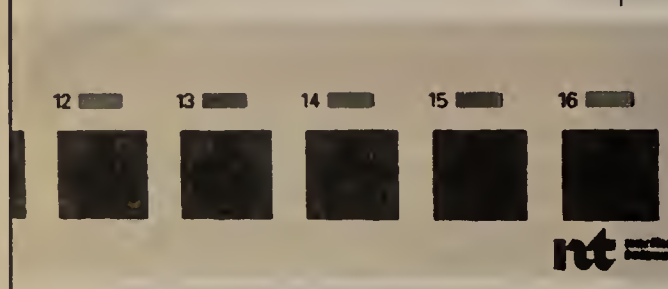
We're talking standard, everyday jacks here.



What makes these everyday jacks so nimble and quick is the wiring system. Integrated Building Distribution Network (IBDN) from Northern Telecom.

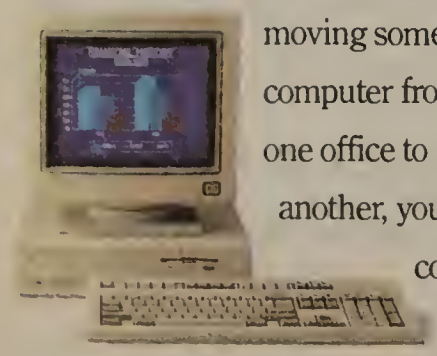
That's because IBDN uses unshielded twisted pair wire, along with fiber optic cable, which offers many advantages over the very unnimble and expensive shielded cable.

Phones plug right in. So do computers, video equipment, and just about anything you can imagine. That's pretty nimble.



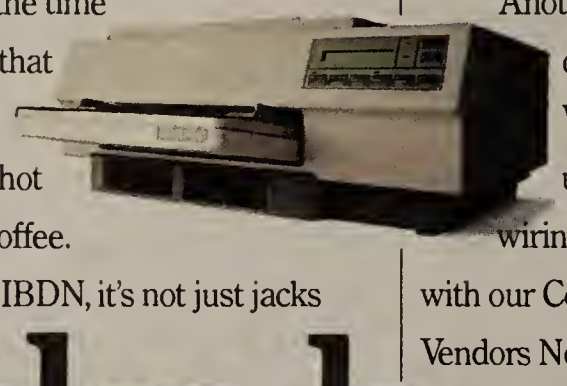
And quick?

Well, let's just say, if you were moving someone's computer from one office to another, you could do it in the time it takes that person to get a hot cup of coffee.



With IBDN, it's not just jacks that are so versatile either. You'll find Local Area Networks fit into the system beautifully. And our open architecture, which adheres to all major standards including ISDN, 10 Mbps Ethernet, 16 Mbps Token Ring and 100 Mbps FDDI, lets us tailor a network to meet the needs your business faces today.

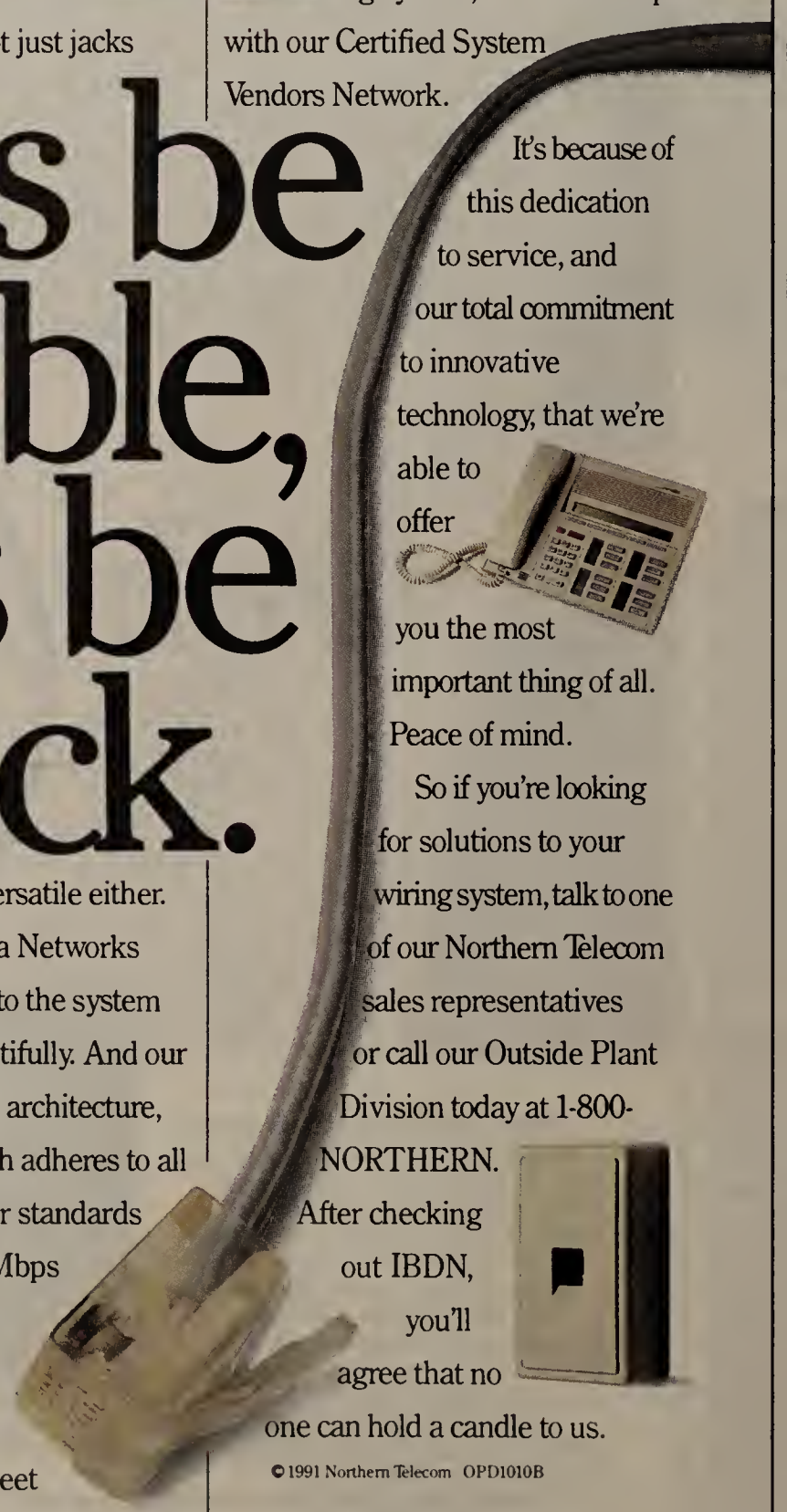
And lets you jump into the future with confidence.



Another thing that we're very quick on is support. When you turn to us for an end-to-end wiring system, we'll back it up with our Certified System Vendors Network.

It's because of this dedication to service, and our total commitment to innovative technology, that we're able to offer you the most important thing of all. Peace of mind.

So if you're looking for solutions to your wiring system, talk to one of our Northern Telecom sales representatives or call our Outside Plant Division today at 1-800-NORTHERN. After checking out IBDN, you'll agree that no one can hold a candle to us.



© 1991 Northern Telecom OPD1010B

nt northern telecom

TECHNOLOGY THE WORLD CALLS ON.™

IF YOU THINK THERE'S A SMARTER HUB THAN ACCESS/ONE, GET OUT OF TOWN.

ON US.

Many claims have been made about the connectivity of certain hubs. But now it's time to set the record straight.

Ungermann-Bass® is the only networking company that will fly you to one of our worldwide demonstration centers.* Then you can see in person why the Access/One® smart hub offers more options than any other network platform. More media. More protocols. More vendor connectivity. IBM,® Digital,® Tandem,® Sun,® Apple,® H-P® and more.

Access/One offers you a completely modular system with scaleable configurations from basic connectivity to complex internetworking. What's more, it's standards-based. So it fits into your existing network and gives you plenty of room to grow.

The bottom line is, Ungermann-Bass can show you today the migration path everyone else is just talking about.

Some might say we're going to great lengths to prove a point. But the way we look at it, there's only one way you can be sure . . . a first hand demonstration.

So call **1-800-873-6381** and we'll rush you a qualifying kit to get you on your way.

Ungermann-Bass

*Travel offer restricted to MIS and IS professionals who meet qualifications established by Ungermann-Bass. Offer good in North America only. Access/One and Ungermann-Bass are registered trademarks of Ungermann-Bass, Inc. All other company names are registered trademarks of their respective holders. © 1991 Ungermann-Bass, Inc.

"Given the strategic significance of our telecommunications infrastructure, our fault tolerance to local loop failure left a lot to be desired."

—MIS Director

New York Telephone speaks my language.

Telecommunications had become integral to our business strategy. Mission-critical applications were completely dependent on the network, which was completely dependent on the local loop. Any loop failure would surely crash the network and, in turn, the whole enterprise.

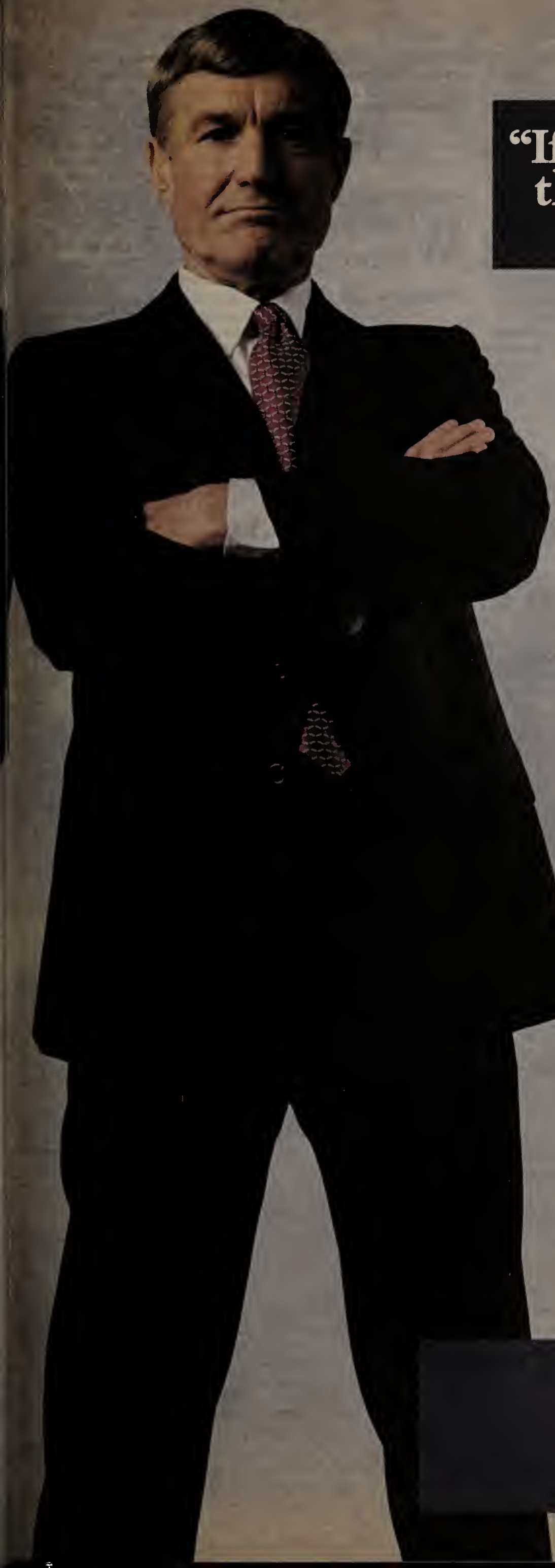
Redundancy was called for. But how much redundancy? At what cost?

Fortunately, disaster protection is a New York Telephone specialty. They took us through the whole array of options. Count diversity. Cable diversity. Route diversity. Riser and closet diversity.

They showed us how they could split our circuits between two central offices, to assure service in case of a loop failure. They call it Alternate Serving Wire Center Service, and the cost was well within our operating budget.

Obviously, no system is completely fail-safe, but thanks to New York Telephone, downtime in the local loop doesn't have to mean downtime for us.

© New York Telephone 1991



"If the network goes down, the company goes belly up."

–CEO

New York Telephone speaks my language.

Our network is a competitive weapon, possibly the most important one we have. In my worst nightmare, a backhoe severs an outside cable, leaving us completely defenseless, hemorrhaging money.

We needed backup, a contingency plan that would kick in when disaster strikes.

But how far were we willing to go to guard against events that were, admittedly, unlikely? And how much were we willing to pay for peace of mind?

New York Telephone had some answers, which helped us weigh acceptable risk versus acceptable cost. And they helped us find a disaster protection plan that was right for us.

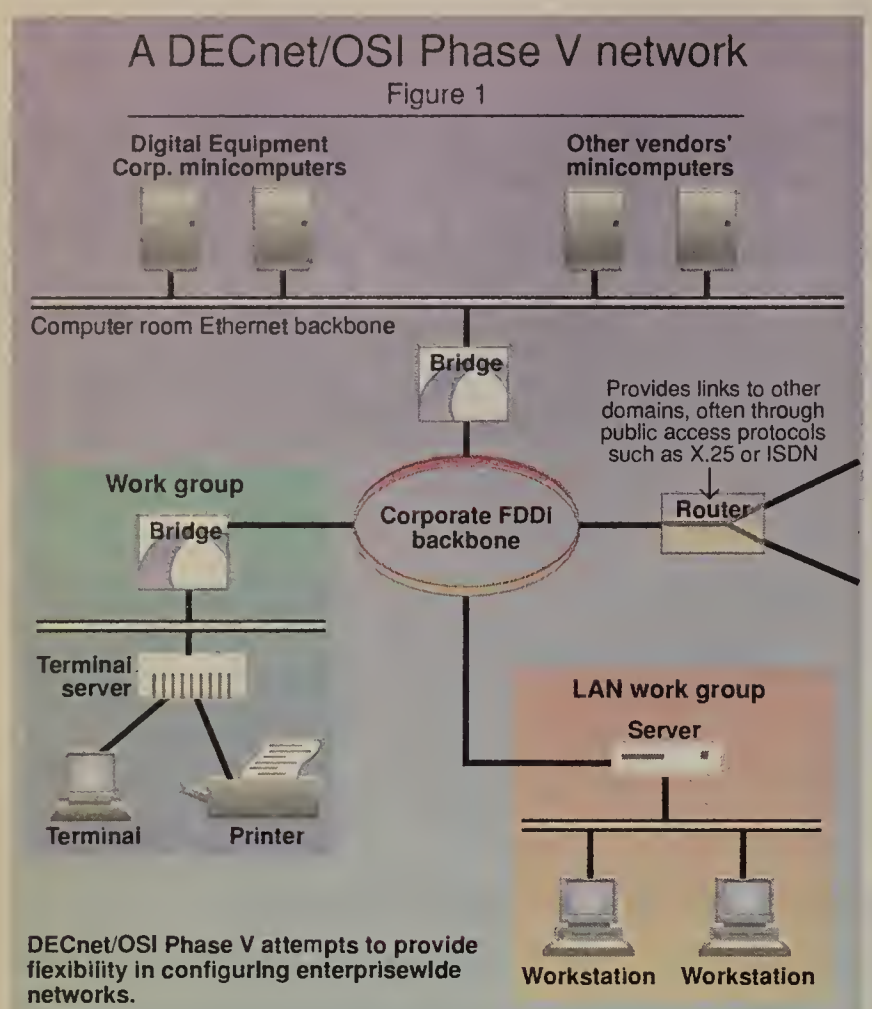
Thanks to New York Telephone, if and when that backhoe hits that cable, it might hurt a little. But we'll get over it.

For more information about Disaster Protection, contact one of our authorized sales agents, or call New York Telephone at 1-800-942-1212, Operator 12.

We're all connected.

New York Telephone

A NYNEX® Company



DECnet/OSI Phase V attempts to provide flexibility in configuring enterprisewide networks.

GRAPHIC BY SUSAN SLATER SOURCE: CARL MALAMUD'S *ANALYZING DECNET/OSI PHASE V*

(continued from page 50)
and their equivalent TCP/IP services.

In addition to native TCP/IP and NFS support and the DECnet-Ultrix Internet Gateway, Phase V attempts to add integration of TCP/IP at the network layer. For example, routers are being built that allow both TCP/IP and DECnet/OSI traffic to be routed. These routers enable users to integrate multiple protocols into a single enterprisewide network.

A final layer of integration of TCP/IP and DECnet is with the network management platform. The DEC Management Control Center (DECmcc) allows a single management director to control and observe TCP/IP, OSI and DECnet networks (see "Managing multiprotocol environments," this page).

For OSI and DECnet environments, the Common Management Information Protocol (CMIP) is used as a network management protocol. For TCP/IP environments, the Simple Network Management Protocol (SNMP) is used to request network management information. The DECmcc network management station supports both CMIP and SNMP, allowing management of several architectures from a single net management station.

With DECnet/OSI Phase V, DEC may have bitten off more than it can chew. The company is trying to keep its products compatible with a huge installed base of Phase IV nodes while providing compatibility with the emerging international computing environment based on OSI. To make things even more complicated, the company has added more TCP/IP support.

If the plan works, users will be able to let a DECnet coexist with another vendor's computing environment. Naturally, DEC's goal is to sell hardware and software. Multivendor networking opens up several sales areas to the company. There's a risk: If DEC's products are not up to par, then instead of invading other vendors' turf, it has allowed the other vendors to invade DEC accounts.

DEC is pursuing a two-part strategy. First, it wants to retain its current accounts. Instead of offering simply OSI, the company offers OSI, backward compatibility and what DEC calls value-added supplementary services. Thus, DEC sales representatives can argue that buying other vendors' OSI software and hardware will mean a loss in functionality.

The second part of DEC's strategy involves invading the opposition's turf. With a universal network management station, DEC equipment can be used to manage other vendors' networks. With OSI and TCP/IP compatibility, DEC hardware can be used as servers for other vendors' workstations. Once DEC gets its products in the door with compatibility, it will be in a position to attempt to distinguish itself with value-added services.

> With DECnet/OSI Phase V, DEC may have bitten off more than it can chew.
>
> ▲▲▲

That brings up the matter of equipment. True Phase V-compatible equipment has been slow to appear. Of course, DEC has older OSI and TCP/IP products. Some of the more recently announced OSI capabilities include OSI support for VMS and Ultrix. This preliminary OSI support allows FTAM, X.400 and other major services to be executed, but it does not integrate the OSI services into DECnet in the way in which DECnet Phase V intends.

Although Phase V products are currently sparse, DEC hopes that giving users a coherent, long-term vision of its strategy for dealing with TCP/IP and OSI will keep them from moving toward other vendors' architectures.

The true test of DEC's grand strategic vision will be in products. If its offerings achieve its interoperability objective, DEC will do well. Meanwhile, DECnet Phase V is likely to open a lot of doors for DEC. What will be interesting, however, is whether the company can keep them open.

Networks key to surviving strike

continued from page 21

many carriers more quickly, which would be critical in a rail strike situation," Anderson said.

EDI and tracking systems would have helped trucking companies maximize their fleet and capitalize on new business opportunities during the strike.

Burlington Motor Carriers, for example, uses a satellite-based tracking system that enables a dispatcher to send textual electronic messages to truck drivers anywhere in the country informing them of their next destination. The system also uses Loran, a long-range navigational system, to pinpoint the location of drivers.

During a rail strike, Burlington Motor's tracking system could have enabled it to redeploy trucks more quickly to handle an influx of new shipping orders.

"Our tracking system would have enabled us to increase the utilization of our fleet during a strike," said Scott Blalock, manager of telecommunications at Burlington Motor in Hurst, Texas. "Our trucks would have been able to move more loads per day and run fewer empty miles."

In addition, EDI and tracking systems could have helped some rail carriers better weather the strike. Bob Schotman, director of customer information services at CSX Transportation, Inc., a large rail carrier, said EDI would have been invaluable had CSX's management decided to continue running the railroad using managers to replace striking workers.

CSX uses EDI to receive bills of lading, send out freight bills and track shipments, eliminating much of the paperwork needed to administer the railroad. This reduction in clerical work would have made it possible for CSX's management to continue operations throughout an extended strike, Schotman said.

Managing multiprotocol environments

Network management protocols are all the rage in today's multivendor, multiarchitecture data communications environments. There's a problem, though: If you have multiple architectures, you need multiple management protocols.

Open Systems Interconnection networks use the Common Management Information Protocol (CMIP). That takes care of true OSI as well as Digital Equipment Corp.'s DECnet Phase V.

But what about Phase IV? It uses a different management protocol known as the Network Information Control and Exchange (NICE). And what about Transmission Control Protocol/Internet Protocol? It uses the Simple Network Management Protocol (SNMP).

What about T-1 wide-area links? Ethernet bridges? Terminal servers? Three more protocols to add to the list.

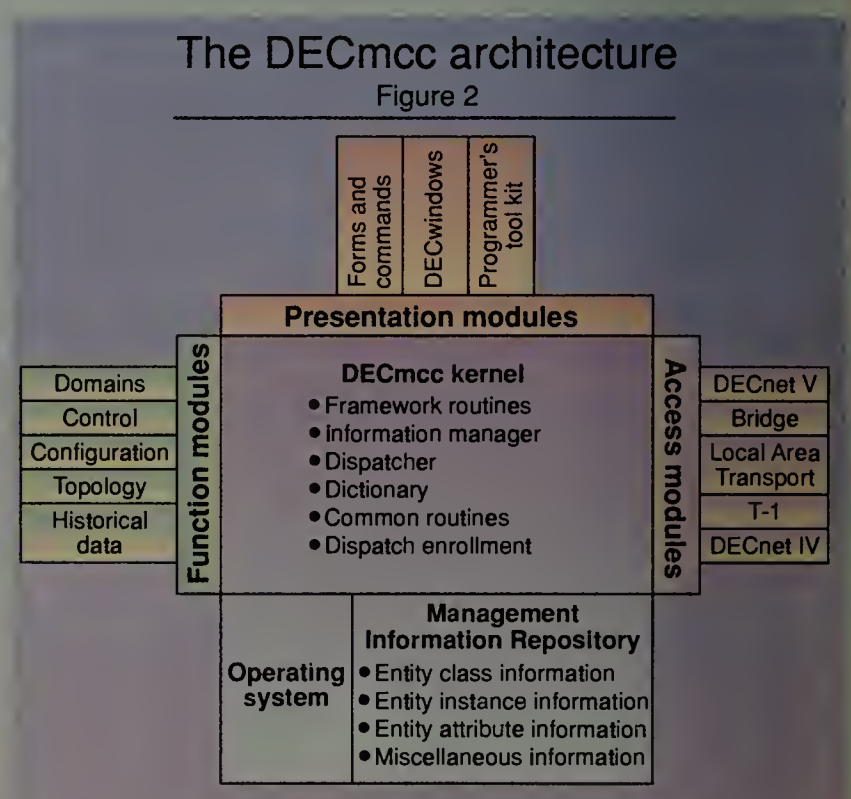
This plethora of protocols poses a real problem for the network manager. It's possible to hope that everybody migrates to a single standard. CMIP and SNMP are two standards often held out for this monolithic role.

However, the reality is that no single standard will do the job. Even if CMIP gets crowned, you can bet that new networks will add new protocols.

DEC has tackled this multiprotocol management problem by keeping multiple protocols but providing a single management environment known as the DEC Management Control Center (DECmcc). DECmcc is what's known as a director, a piece of software that controls devices on the network.

DECmcc has its own architecture, separate from the protocols it manages.

We can divide the task of managing the network into three pieces. First, there is the question of access. CMIP, SNMP and NICE are all examples of access protocols.



The DEC Management Control Center software divides network management tasks into 3 categories: presentation modules, which accept user commands and display results; access modules, which access data using different network protocols; and function modules, which process data.

GRAPHIC BY SUSAN SLATER SOURCE: CARL MALAMUD'S *ANALYZING DECNET/OSI PHASE V*

Next, we have the question of function. The function of turning a device on, for example, can apply to a variety of access protocols. In DECmcc, the function module issues a single call, which then applies to various entities on the network, each with an access protocol.

Finally, we have the question of presentation. One manager may have a workstation using the X Window System, another may have a simple DEC VT-100 terminal, and a third may have an IBM 3270 terminal.

By splitting up the functions, DECmcc allows a modular approach to network management. New modules can easily be added to the platform at run time, allowing new functionality to be added slowly.

Lying under all these modules is a data base management system — the management information repository. The repository contains information about the entities on the network as well as historical data.

— Carl Malamud

Users pan global videoconference

continued from page 23

approval to set up a conference, and because there are only two satellite links over to Singapore, it's often a matter of waiting your turn," Ehlers said.

"I'm anxious to see undersea fiber installed so there will be additional competition and paths to get into Singapore," he added. "The long lead time doesn't allow us to set up emergency meetings, for instance, which is something we would find useful."

HP's Fischer agreed. "One of the main reasons we pulled our satellite-based network was the long time line to reserve the bandwidth," he said. "Instead, we opted for a switched 56K bit/sec network for all internal international conferences."

The value of international videoconferencing warrants a timely resolution to issues of insufficient bandwidth and links, users said. Foreign post, telegraph and telephone administrations must work harder to improve their telecommunications infrastructures.

"The benefits of international videoconferencing are so much more than a cost-effective alternative to travel," Unisys' Champa said. "In many respects, it's better than travel because you're able to get more people involved in the process, and that leads to better informed decisions."

Letters

continued from page 27

The flaw with this assumption is that he maintains that all lost opportunities represent lost revenue, when in reality, actual revenue represents only a small percentage of potential opportunity — perhaps as low as 10%. By correcting for this imbalance, Mr. Hooke's calculated savings would be reduced to $13.50 (2.7% of $500) per 1,000 calls.

A second critical assumption in Mr. Hooke's calculation is that other carriers use equipment and design methodology in their networks that are similar to AT&T's.

Because the type of equipment, its vintage, number of devices within a given circuit and so on greatly affect a service's performance, the global assumption that performance of AT&T 800 service is always better than its competitors' is suspect at best. The data presented is pure speculation from a biased internal AT&T organization, which, to my knowledge, is not guaranteed "in writing" — to borrow a recent campaign slogan — by the AT&T tariffs.

I suggest AT&T put its money where its mouth is. It should guarantee its claims for higher service performance and reimburse customers when these claims are not met.

Michael Hitch
Senior telecommunications engineer
Mitchell Systems Corp.
Arlington, Va.

Con

continued from page 27

both switched voice and television services. Therefore, it can start with its existing television distribution design and add communications services over the same facilities without much difficulty.

No one seems to have tackled the fundamental question: What is the most effective way to distribute broadband services in the public interest? If they did, they would quickly recognize the following points:

- People who don't want broadband service should not have to pay for it.
- Companies that want to offer broadband services should be able to do so under rates and guidelines that apply to all service providers. Fiber to the home should not be limited to companies that can pay $100 million to build a local-area network.

What is the most effective way to distribute broadband services?

▲▲▲

The performance of fiber circuits has increased dramatically while costs have declined. Fiber costs today are about 39% of what they were only five years ago. We should allow the public to enjoy these savings by insisting that fiber to the home pay its own way and being open to all service providers on equal terms.

Under such conditions, cable companies could transmit hundreds of TV programs and telephone companies could have circuits to the home while other vendors could offer video games, educational programs and other services, sharing the savings created by the use of a single system that provides fiber to the home.

Such a system would be much simpler than any fiber system proposed to date. The transmission of data would be similar to packet switching, and television transmission would be digital.

A recent report by Probe Research, Inc. of Cedar Knolls, N.J., said these high-tech experiments by local carriers are often public relations exercises. The same report suggested that creative management of a local exchange may have to wait for IBM or Telecommunications International, Inc. to take over a Bell Atlantic Corp. or Nynex Corp. The study could be right.

Bridge 16 Mb Token-Ring Networks with Andrew

New 16 Mb local and remote source routing bridges from Andrew connect token-ring networks across the street or around the world. High performance local bridges provide efficient connections to 4 and 16 Mb backbone and departmental rings. Remote bridges include data compression to increase throughput over WAN links without increasing link speed cost.

Source Routing and IBM Compatible. All Andrew source routing bridges offer compatibility with the IBM LAN Manager, Netview and IBM bridges.

Single Point Bridge Management. Easily observe system performance, network status and configure your network from any designated workstation. . .worldwide!

Easy Installation and Control. Andrew bridges are rack mountable for easy installation and cabling to adjacent MAUs. Front panel LCDs give network status information for simplified troubleshooting.

Andrew offers a complete token-ring system to provide you with uncomplicated solutions for all your enterprise network needs.

Call us at 800-733-0331 ext. 3107

ANDREW
Andrew Corporation
2771 Plaza Del Amo
Torrance, CA 90503

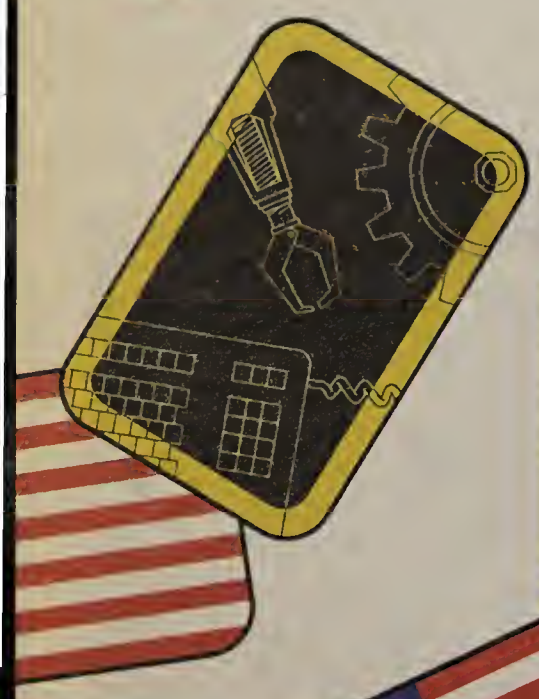
Andrew products are available worldwide. Call for a distributor in your area. In the U.S. call (213) 320-7126. Fax (213) 618-0386; in the UK 0734-894689; in Canada 800-267-1821. IBM is a registered trademark of International Business Machines Corporation. © 1990 Andrew Corporation

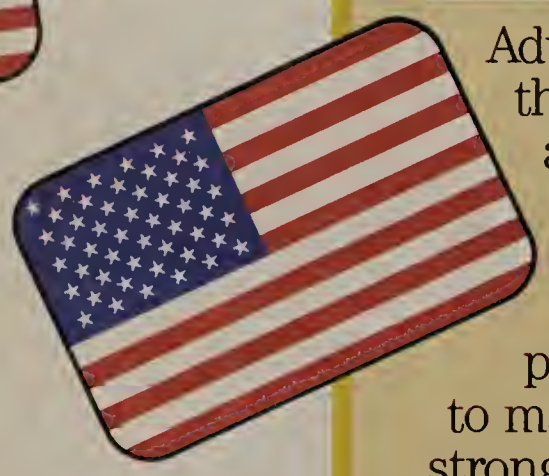
THE

MANUFACTURING NETWORKS

CONFERENCE

CHICAGO, AUGUST 12–13, 1991





Playing the Trump Card of Technology

Playing the trump card of network technology today will determine your competitiveness in the global marketplace tomorrow.

Advanced manufacturing networks can level the playing field for U.S. companies competing against aggressive foreign rivals that often enjoy lower labor costs and protectionist trade policies. Networking technology streamlines design, development and production and enables you to bring products to market more quickly. It allows you to build stronger ties to customers and suppliers and operate more efficiently and productively.

At this conference you'll see how leading companies are building the enterprise manufacturing network—an information superhighway that extends from the factory floor to the executive suite and out to customers and suppliers.

Learn about the hottest networking topics from speakers of the leading manufacturing companies …Alcoa, Corning-Asahi, Digital Equipment, General Motors, Hughes Aircraft, IBM, John Deere, Monsanto, Northrop, SteelCase, Texas Instruments, Warner-Lambert, and The Corporation for Open Systems International. Plus…hear a special keynote presentation from a top network official at Saturn Corp.

- Making CIM and concurrent engineering a reality
- Handling network cutovers and upgrades without headaches
- Designing and building an open, standards-based manufacturing network
- Applying LANs effectively
- Using MAP-based networks
- Breaking down the organizational barriers that stand in the way of manufacturing network excellence
- Building a paperless manufacturing environment
- Extending your networks to customers and suppliers
- Making JIT manufacturing work

The Product Showcase at The Manufacturing Networks Conference gives you the opportunity to interact with top networking vendors and gain the product education you need to make key product purchasing decisions.

Interested in exhibiting? Call Tom Reiling at (508) 470-3870.

Remember: The technology decisions you make today will shape your future. Call **(508) 470-3880** today to get more information on this one-of-a-kind event.

Sponsored By:

NETWORK WORLD

Digital Consulting, Inc.

A41WN

Competing designs for 100M bit/sec data over twisted pair

Figure 1

Company	Modulation	Cabling/ distance	Signal power/loss characteristics	Advantages	Disadvantages
IBM Armonk, N.Y. (914) 934-4000	125M-baud signal using standard FDDI 4B/5B encoding; primary radiated emission at 62 MHz	Requires IBM Type 1 shielded twisted pair; up to 100 m	Transmit signal level at 200 milliVolts (mV); receive signal level very low, from 40 mV (14 dB loss) down to 20 mV (20 dB loss)	— Should enable existing FDDI chipsets to be used — Low power signal; should satisfy FCC and international emission limits	— Very sensitive receiver circuitry required; could raise product costs — Requires IBM Type 1 shielded twisted pair
SynOptics Communications, Inc. Mountain View, Calif. (408) 988-2400	Same as IBM above; radiated emissions also peak at 62 MHz	Requires IBM Type 1 shielded twisted pair; up to 100 m	Transmit signal level is 800 mV; receive signal level from 160 mV (14 dB loss) down to 80 mV (20 dB loss)	— Should enable existing FDDI chipsets to be used — Likely the least expensive design to implement	— Concern about meeting FCC emission limits under new test guidelines or international standards — Requires IBM Type 1 shielded twisted pair
Crescendo, Inc. Sunnyvale, Calif. (408) 732-5955	Proprietary encoding method not FDDI-compatible; radiated emissions peak at 31 MHz	May operate over unshielded twisted pair at limited distances (around 50 m)	Transmit signal level 850 mV; receive signal level 300 mV (9 dB loss over 50 m)	— Enables use of unshielded twisted pair wiring over short distances — Lower frequency emissions more likely to pass FCC	— Proprietary encoding not supported by existing FDDI chipsets; could raise costs dramatically — Emission characteristics on unshielded twisted pair need further study

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 43)

The Type 1 cabling is also characterized by a higher impedance (measured in ohms of resistance) than telephone-type twisted-pair wire.

As a general rule, the greater the impedance, the less a high-speed data signal attenuates. IBM-specified cabling, which is made by several manufacturers, is 150 ohm — meaning it offers 150 ohms of resistance. Most telephone-type twisted pair is 100 ohm.

The shielding inherent to Type 1 cabling reduces emissions to a fraction of what they would be without shielding, says Robert Love, senior engineer of IBM's Cabling System Center in Research Triangle Park, N.C. Love says that even the best grade of unshielded twisted-pair wire is still at least twice as lossy as Type 1 shielded twisted pair.

But he concedes that there is considerable user pressure for a new IEEE specification that allows 16M bit/sec token-ring operation over unshielded twisted pair.

And so IBM is reviewing the situation. "We're looking at a basic design [for 16M bit/sec token ring on unshielded twisted pair] in the 1992 time frame," Love says. But he refuses to elaborate on the matter.

With this in mind, should users that are installing wiring now and project 16M bit/sec requirements in the future stick with Type 1, or should they shift to unshielded twisted pair? There are good reasons for sticking with Type 1 unless the user is willing to invest in one of the new, high-quality varieties of unshielded twisted pair (see "New twists to twisted pair," page 58).

IBM's new version of the 16M bit/sec token ring, which may be called 16BaseT, will almost certainly be more restricted — as far as the number of nodes and distance — than the current shielded twisted-pair-based 16M bit/sec token-ring specification.

Furthermore, it is unlikely that the new version can be supported on already-installed telephone wiring. One of the newer types of high-performance twisted pair will probably be required.

The chances for TP-DDI

It is unclear whether data can be reliably and legally transmitted over twisted pair at 100M bit/sec, the data rate specified in the FDDI standard. Numerous competing technology proposals, each with unique benefits and problems, are currently being considered (see Figure 1, this page).

The proposal from twisted-pair pioneer SynOptics Communications, Inc. of Mountain View, Calif., calls for a transmitted signal similar in nature to FDDI's; that is, a 125M-baud signal pattern, which carries 100M bit/sec of data in the same 4B/5B encoding scheme that FDDI uses over optical fiber.

According to Peter Tarrant, SynOptics' FDDI product manager, the company is still working on developing a product that incorporates this proposal.

But some major participants in the 100M bit/sec-over-twisted-pair fray — referred to as Twisted Pair Distributed Data Interface (TP-DDI or TDDI) in the ANSI X3T9.5 standards committee that is addressing the issue — aren't convinced that SynOptics' design will work.

Unquestionably, 100M bit/sec data can be carried over twisted pair for short distances. The sticking point is whether this approach will generate an amount of radiated electromagnetic energy that exceeds FCC emission limits. If so, this approach would constitute an unlawful source of electromagnetic interference and perhaps even an environmental or health hazard.

"We have tested and established compliance with current FCC requirements," says SynOptics' Tarrant. He would not speculate, however, as to whether the current SynOptics design will pass under the new and more stringent test procedures that go into effect next year.

A low-power alternative

IBM's TP-DDI design is similar to SynOptics', but it calls for a much lower signal power level, both for transmission and reception. Where SynOptics' design calls for an 800-millivolt transmit level, IBM has cut that down to 200 millivolts, a very significant difference in signal power.

The purpose of the IBM power cutback is to minimize emitted radiation, but it also requires that receivers be far more sensitive, which could also cause them to be much more expensive.

It's also unclear whether reliable receivers for such low-signal power levels can be commercially produced and, if so, how much they would cost.

In both IBM's and SynOptics' approaches, the transmitted signal radiates at a frequency of 62.5 MHz. This represents a much higher frequency emission than those of earlier twisted-pair LANs, the primary emissions of which have always stayed below 30 MHz.

The FCC considers emissions over 30 MHz as genuine interference threats to other forms of radio communications.

For example, the 62.5 MHz primary emission of both IBM and SynOptics falls within the range of frequencies used for regular VHF television broadcasting, and the potential certainly exists for interference between the two.

To minimize their emissions, both IBM and SynOptics require that only Type 1 twisted-pair cabling be used in their respective TP-DDI schemes. Furthermore, they require that two strands of Type 1 be used for each direction of the FDDI.

The full FDDI specification calls for dual counterrotating rings (on two pairs of fiber), so a full TP-DDI implementation would require four strands of the bulky Type 1 cabling. There are also proposals on the ANSI X3T9.5 TP-DDI schedule for a way to lower this emitted frequency by changing the type of signal encoding.

One such proposal from Crescendo, Inc. of Sunnyvale, Calif., calls for a proprietary 4-to-1 encoding technique to keep the primary radiated emission down to about 31 MHz. The company predicts that the scheme could yield 100M bit/sec data rates that would operate over unshielded twisted pair at limited distances — perhaps 50 meters.

The major criticism of Crescendo's approach, or any encoding technique that doesn't conform to the FDDI standard, is that it is incompatible with the FDDI chipsets that several suppliers, including AMD Co., Motorola, Inc. and National Semiconductor Corp., currently offer.

New, more expensive chipsets would be required to produce 100M bit/sec data signals in the new format.

Fiber inevitable?

The problems with running data at 100M bit/sec and higher

(continued on page 58)

Comparison of cabling costs

Figure 2

Media	Termination time per connection	Cable cost (per foot)	Cost per wall plate	Typical installation cost for a 100-node LAN (complete)*	Installation cost (per station)
Unshielded twisted pair; DIW-24 cable, polyvinyl chloride jacket, RJ-45 connectors	5 min (4 conductors)	5 cents	80 cents	$88,000	$880
Shielded twisted pair; IBM Type 1 cable; IBM data connectors/wall plates	15 min (4 conductors and ground)	22 cents	$9	$120,000	$1,200
Optical fiber; 62.5/125-micron multimode 'duplex' (single-pair) fiber; multifunction wall plates	30 min (2 fibers with ST connectors)	60 cents	$20 to $30	$180,000	$1,800

* Complete installation cost for two-pair copper or two-fiber (single fiber pair) to each station. Includes labor for cable pulling/termination, wall plates and patch panels (of fiber splice cabinets). Assumes PVC-insulated cabling — no plenum or Teflon. Costs will vary with location, due mainly to labor costs and code requirements. These comparisons try to show just the salient differences based on media selected and presume all other factors are nearly equal.

SOURCE: PROTEON, INC., WESTBOROUGH, MASS.

(continued from page 57)
over twisted pair make it clear that twisted pair's days as the data network cabling of choice are coming to an end.

today may be doubled just by using optical fiber rather than regular twisted pair — from about $900 per station for two- to four-pair D-type Inside Wiring-24 twisted pair to $1,800 per station for a single pair of 62.5/125-micron multimode fiber. With Type 1 shielded twisted pair, the savings of copper over fiber is nearly halved.

Also, the cost of fiber and its installation are rapidly dropping. As they do, the incentive for perpetuating usage of copper twisted pair is quickly eroding.

In fact, even SynOptics, which owes much of its success to the continued exploitation of twisted pair for LAN data cabling, acknowledges that its as yet unnamed TP-DDI product (likely to be delivered later this year) will have a limited number of users. The product will be oriented only to users that already have Type 1 cabling installed and that plan to migrate from 16M bit/sec token ring to 100M bit/sec in the near future, a company spokesman says.

Cabling selection: making the right choice

Figure 3

Media:	In-place unshielded twisted pair 24 to 26 AWG	New unshielded twisted pair D-type inside Wiring-24 (24 AWG)	Data-grade unshielded twisted pair AT&T 1061, Belden Wire and Cable Co. 1455A	Shielded twisted pair IBM Type 1	Optical fiber 62.5/125-micron multimode
Pairs/station:	Minimum of 2; often 25-pair telephone company cable, already installed	Minimum of 3; 4 recommended	4 pair	2 pair	1 pair
Application:					
Analog PBX/voice; modem/dial data; telecommunications	●	●	●		
Digital PBX/voice; ISDN; data/voice; 64K bit/sec to T-1	●	●	●	●	●
LAN; up to 4M bit/sec; low-speed token ring	●	●	●	●	●
LAN; up to 10M bit/sec; 10BaseT Ethernet	●	●	●	●	●
LAN; up to 16M bit/sec; high-speed token ring		●	●	●	●
LAN; up to 100M bit/sec; FDDI data rates			●	●	●
Beyond 100M bit/sec					●

● A good choice; recommended ● May be technically possible but not recommended ● Unnecessary; likely overkill

AWG=American Wire Gauge

GRAPHIC BY SUSAN SLATER SOURCE: EAST COAST CORP., TRENTON, N.J.

If twisted pair can handle 100M bit/sec applications — and that's still a big if — it will be limited to very short distances. And it will likely require a special grade of twisted pair, such as the IBM-specified cabling mentioned above. This cable is not much cheaper to install and maintain than optical fiber (see Figure 2, page 57).

As the table shows, the cost of a new 100-node LAN installation

The narrowing options

Clearly, unshielded twisted pair has become the cabling of choice for Ethernet. New Ethernet installations are usually 70% unshielded twisted pair, and that percentage is rising, says John McHale, president of Dallas-based NetWorth, Inc., which manufacturers a line of 10BaseT Ethernet hubs.

McHale says that 20% of new installations are running Type 1. The remaining 10%, he says, are running either coaxial cable (primarily as a distance extender to existing thin-wire Ethernets) or optical fiber.

Simply impossible

In McHale's view, unshielded twisted pair is a simple impossibility for data rates of 100M bit/sec. It "clearly violates FCC rules," he says. "You would have to change the 4B/5B encoding [of FDDI], which would require new silicon."

Perhaps the best advice for choosing the right type of data cabling is summarized in Figure 3 on this page, provided by Trenton, N.J.-based East Coast Corp., one of the few wiring contractors that handles and installs both optical fiber and the gamut of unshielded twisted-pair cabling.

"There is increasingly a mix [of optical fiber and copper] going in," says Frank Kowalik, field installation supervisor with East Coast. "Fiber now is running, at least to the wiring closet, in most new state-of-the-art installations. And [fiber] is just now starting to go, along with copper, to the desktop."

According to Kowalik, a large portion of installation bids for new cabling and proposals that companies issue continue to specify only copper cabling.

But times are changing.

"It's a different cabling world today," he says. "Everyone wants their data network to handle future requirements, and many are realizing that unshielded twisted pair won't take them as far into the future as they would like."

New twists to twisted pair

Network users' need for high-speed data transmission has caused wire manufacturers to add a new twist — several, in fact — to twisted-pair wiring.

A new type of data grade, or high-performance, twisted pair is available from leading cable manufacturers such as AT&T and Belden Wire and Cable Co. Designed for data speeds of 16M to 100M bit/sec, this wiring costs several times more than the standard nickel-a-foot telephone wiring but less than IBM Type 1 shielded twisted-pair cabling.

What makes this new twisted pair truly different from the old is the way it is twisted.

Like most telephone wiring, high-performance twisted pair is usually 100-ohm, 24 American Wire Gauge (AWG) with four pairs per cable. But unlike standard D-type inside wiring, 24-AWG cable, in which each wire pair is twisted about once per foot, high-performance wiring is twisted as many as eight or nine times per foot.

Quieting cross talk

Twisting wire minimizes radiated signal energy and ameliorates the effects of cross talk. Wire manufacturers have found that increasing the twists of twisted-pair wire more dramatically reduces the emissions and the wire's susceptibility to cross talk.

The number of twists per foot is specially calculated to support high data rate frequencies, up to the 125M-baud signaling rate of Fiber Distributed Data Interface.

According to Bill Aranguren, a development supervisor with AT&T Computer Systems, AT&T's data-grade unshielded twisted-pair wiring, called Type 1061A, adds yet another feature: Each pair within the cable is twisted at a different twist rate.

AT&T also offers a teflon-coated plenum version, called Type 2061A. Shielded versions of both of these cables, called Types 1261A and 2261A, for plenum, are also available.

Belden Wire and Cable calls its equivalent wire types 1455A and 1457A for unshielded twisted pair and Types 1456A and 1458A for shielded twisted pair.

Wire manufacturers are hesitant to publish hard data about the performance improvement of the new twisted-pair wire over the old, generally because the characteristics of the new twisted pair vary significantly depending on the level and frequency of the transmitted data signal.

But whether this new and improved unshielded twisted pair will be able to carry FDDI data rate signals and still meet Federal Communications Commission emission restrictions is the subject of some controversy today. In all likelihood, users will never find out.

— Edwin Mier

Pro

continued from page 27
quality and cost-effectiveness of health care delivery.

Although now limited by the network, experiments in distance-learning enable the advanced or remedial student to participate in remote classrooms. An advanced network could enable image-based home medical diagnostics or link patients and medical experts by wire. A fiber network is the cost-effective technology critical to achieving those goals because it can provide all those services on one wire.

The importance of connecting businesses and homes to fiber is often lost in the debates on fiber economics and video service provision. Japan has taken a clear stand on this issue, implementing an accelerated program to install fiber optics during the next 25 years. To that country's credit, all businesses and homes are part of its deployment plan.

In the U.S., New Jersey has explored those infrastructure issues. Its public utility commission considers sophisticated telecommunications capabilities for homes and businesses critical to its competitiveness and economic vitality, as well as a means for achieving other social goals such as better education and health care.

The state's local exchange carriers have been encouraged to accelerate their plans for deploying a ubiquitous, reasonably priced fiber-based network. This policy is supported by analyses showing that the local exchange carriers could accelerate their fiber distribution schedule from about four decades to two with new revenue requirements amounting to no more than the inflationary growth of their current intrastate revenue base.

This revenue shortfall could be provided by inflation-limited rate increases, new network services or productivity improvements within the local exchange carriers.

New Jersey is now considering formally linking its commerce department with the utility commission. A newly formed super agency would continually evaluate the costs of new network technologies along with their benefits: Overseeing phone bills could be balanced with creating new jobs.

Still, some policymakers think that installing fiber in the local loop to connect all homes and businesses is extremely expensive compared with copper and coaxial cable. However, according to my economic analyses, fiber can be deployed cost-effectively for phone services today in selected situations. In order for fiber broadband networks to be feasible, the cost of optoelectronic components — the entire fiber setup — must decrease even further. For provisioning interactive or multiple network services, which is the real issue, fiber always beats copper or coaxial cable.

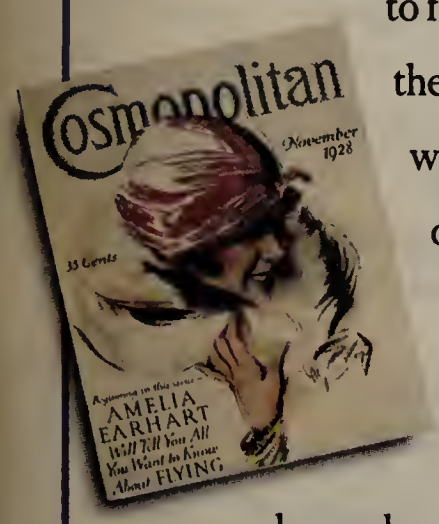
Current public policies dictate that the two major wireline services — entertainment video and telephone — be carried on separate wires owned by the cable television company and the phone company, respectively. This tidy approach to regulation is not appropriate for information age services. Will five services require five wires?

The ultimate pace of fiber deployment to the home depends on whether policies are changed to allow network service providers to offer multiple services. Competition among service providers for the home market would soon have cost-effective fiber at every business and residential doorstep.

She became the first woman aviator to cross the Atlantic, an author, entrepreneur and nurse. Just what you'd expect from a fashion designer.

With the right combination of bravado and talent, there's no telling what you can accomplish.

Nicknamed "Lady Lindy," Amelia Earhart was not only the first woman to fly solo across the Atlantic, she held women's speed and distance records.

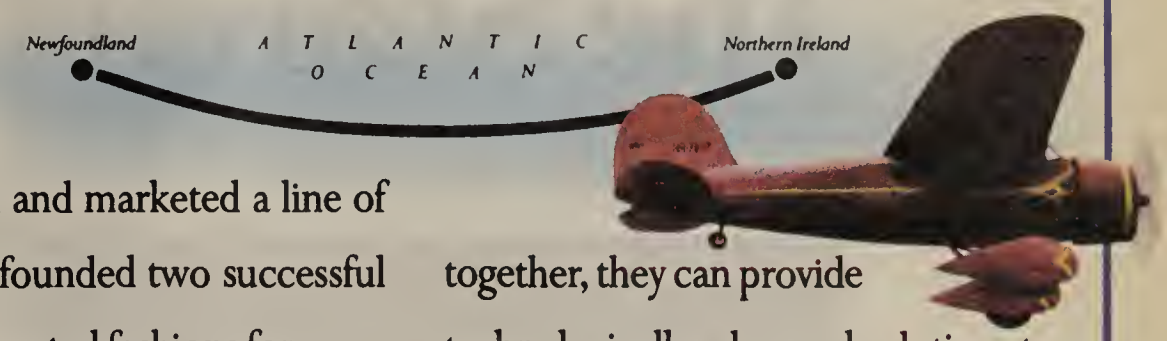


As a nurse during World War I, Earhart began her cause for human rights. Her accomplishments in the air moved her to pen three best-selling books.

She served as aviation editor for *Cosmopolitan* and designed and marketed a line of luggage. She founded two successful airlines and created fashions for top department stores like Macy's and Marshall Field's.

If you understand how Amelia Earhart combined many talents in her pursuit of excellence, you'll understand the commitment of BellSouth.

Individually, the various companies of BellSouth are considered to be among the best in their field. Brought together, they can provide technologically advanced solutions to a variety of communications problems.



HERE'S HOW BELLSOUTH INTEGRATED MANY TALENTS TO HELP THE HEALTH CARE INDUSTRY.

Developed a system for electronic insurance claims processing utilizing an advanced interactive network, reducing overhead costs and handling time.

Created disaster recovery systems employing network and cellular services.

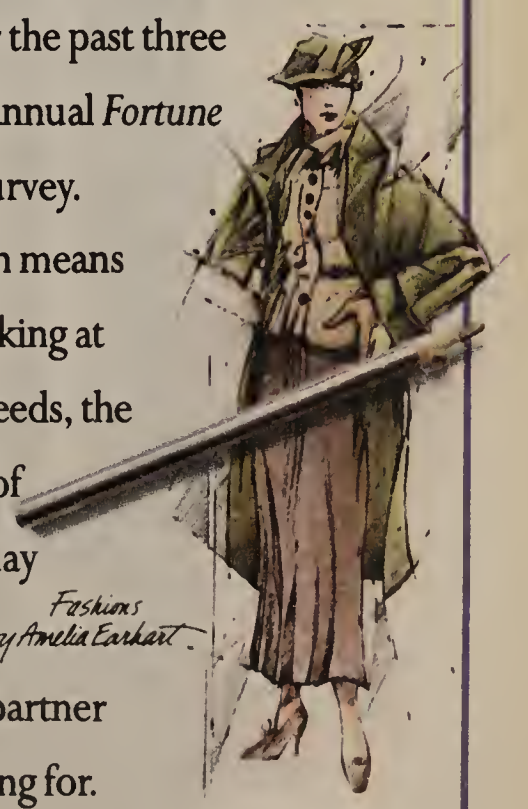
Designed an interactive network linking medical centers, physician groups, insurance companies and employers to achieve a significantly higher level of cost effectiveness in the provision of services.

©1928, THE HEARST CORPORATION. REPRESENTATION OF AMELIA EARHART ©1990 MURIEL EARHART MORRISSEY UNDER LICENSE AUTHORIZED BY CURTIS MANAGEMENT GROUP, INDIANAPOLIS, INDIANA, USA. PHOTO: THE BETTMANN ARCHIVE

©1991 BELLSOUTH CORP.

Senior industry executives have named BellSouth the most admired telecommunications company in America for the past three years in an annual *Fortune* magazine survey.

Which means if you're looking at your own needs, the companies of BellSouth may be exactly the kind of partner you're looking for.



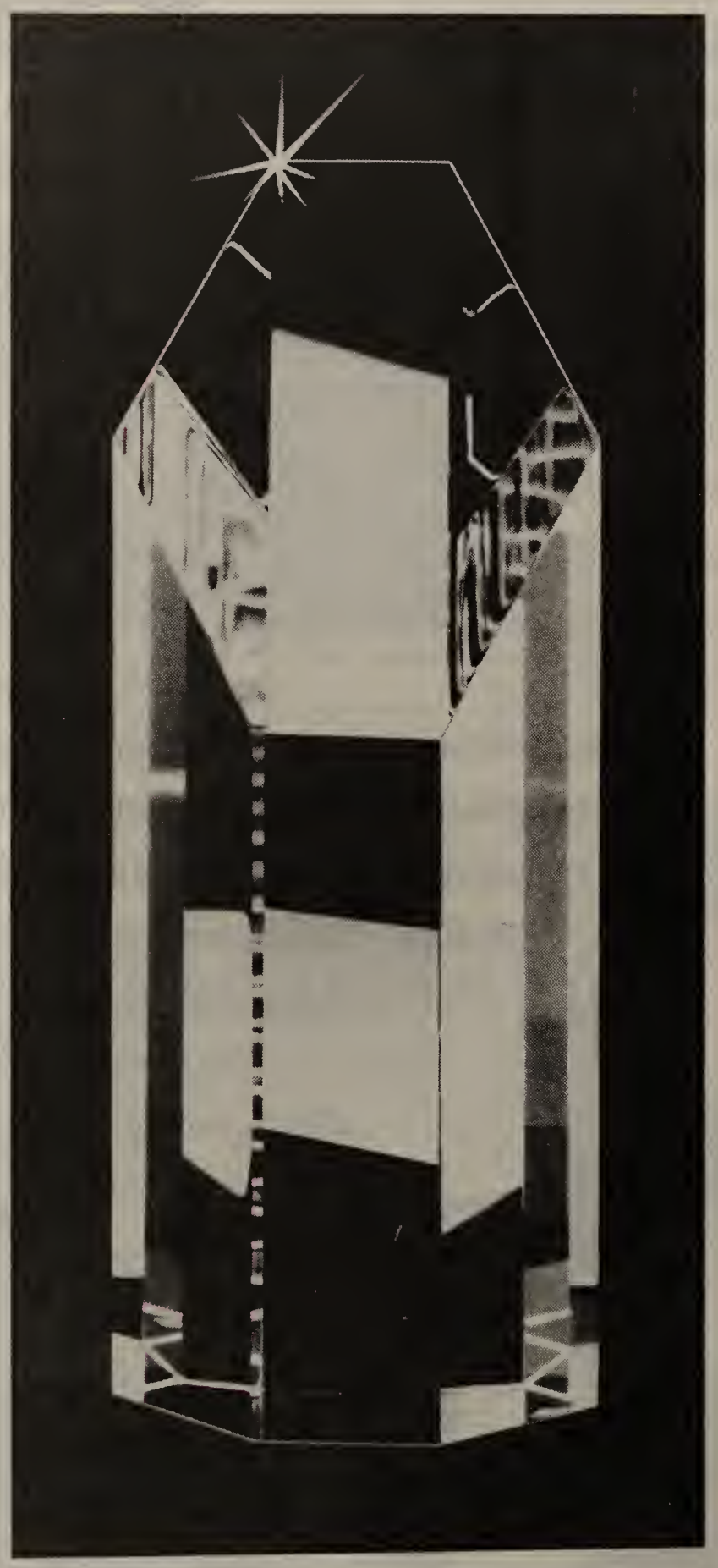
After all, when you surround a problem with remarkable talent, there's no telling how far you can go.

BELLSOUTH®

Telecommunications *Information Services* *Mobile Communications* *Advertising Services* *Everything you expect from a leader*℠

Announcing The 1991 ENNE AWARDS

The Search Continues.



It's time to pay tribute to excellence. And excellence will be honored as the third annual ENNE awards program gets underway.

The ENNE sponsors – *Network World* and NetWorld – are searching

- For companies and organizations using networking technology to their strategic advantage.
- For companies and organizations finding exciting new ways to put those technologies to work.
- For companies and organizations who exemplify best the spirit of enterprise networking.

If you've been successful in using enterprise networking to increase your bottom line, you're eligible for the ENNE Awards.

If you're an enterprise network user, supplier or enterprise integrator you may be a candidate for nomination. Call or write to ENNE Awards headquarters and we'll send you a nomination packet.

In 1991, we will continue our search for the best of the best. And present the ENNEs – our industry's Mark of Excellence.

THE ENNE℠ AWARDS
Honoring The Best Of The Best.

Call, or write for your ENNE Award nomination form today. And salute those who are defining tomorrow.
Deadline for Awards Nominations is June 17, 1991

The ENNE Awards Program 305 Madison Avenue Suite 1424 New York, NY 10165
(212) 983-4965

Firm improves efficiency with LANs

continued from page 1

on the 3090 were limited, many calls still required operators to use books and manuals.

When management began evaluating system requirements for a new service center, which opened last spring, they took the opportunity to consider if new technology could improve customer service procedures and operations. Many believed LANs were the way to go, so Silling was asked to research LAN costs and benefits and make a proposal.

That research resulted in BellSouth Mobility contracting with Memorex Telex Corp. to implement a test network comprising a Banyan Systems, Inc. CNS 486 file server and David Systems, Inc.'s unshielded twisted-pair Ethernet.

The networked personal computers gave operators access to more information than was available on the mainframe, including a directory data base that immediately improved operator response time.

The initial net was so successful that in December, the company decided to move ahead and install seven more LANs across the region.

The networks, located in four sites in south Florida, are connected via 56K bit/sec links, giving users transparent access to all network applications, including electronic mail and gateway access to the host and other systems within BellSouth Mobility.

Due to the intensive data base demands placed on the LAN servers, they are equipped with as many as 32M bytes of random-access memory and more than 1G byte of hard disk storage. Some servers have an 80M-byte cache drive that was added to further increase performance.

With the implementation completed, operators now have access to on-line data bases that include maps showing calling zones, a cellular phone guide, and a cellular exchange code and services directory.

The company has even set its sights on rewriting the massive billing system to make the data more available to the LANs.

The company has just installed a multiprocessor Compaq Computer Corp. SystemPro server running VINES SMP. The server will support Oracle Corp.'s Oracle SQL for VINES as a front end to the mainframe data base, giving users superior access to the host. In addition, the Oracle product will be used for development of a new trouble tracking system.

BellSouth Mobility is also using the LANs to reduce paper document storage needs by utilizing an optical disk system to store call detail reports.

"We save paper. We save time. We save money. That's the whole purpose of the network," Silling said, adding that he looks forward to this summer when the productivity gains from the LANs will show up in budget reports for the first time.

Carriers may offer fraud monitoring

continued from page 2

fairly distribute liability for toll fraud among users, long-distance carriers and customer premises equipment manufacturers. The company questioned the validity of AT&T's claims that its tariffs place the liability for fraud on users' shoulders. Both AT&T and MCI Communications Corp. oppose Pacific Mutual's position.

But it is clear something has to be done. Consumers lose $500 million annually to toll fraud, according to the Communications Fraud Control Association.

"There are two kinds of customers: those who have been victims of toll fraud and those who are about to [become victims]," said Jim Snyder, staff member of the systems integrity department at MCI.

According to Snyder, about 80% of calls placed by hackers go to one of three places: Colombia, Pakistan and area code 809, which covers Caribbean countries including the Dominican Republic and Jamaica. Often, the calls are placed at night or during weekends. It is this thumbprint that would enable carriers to set up monitoring services to identify unusual activity. He said MCI is considering such a service but has not yet decided whether to offer it.

AT&T would also be interested in rolling out such a monitoring service if customer demand exists, a spokesman said.

Henry Levine, a telecommunications attorney in Washington, D.C. who helps customers put together Tariff 12 deals, said he knows of several users that have requested toll-fraud monitoring from AT&T. He said AT&T is currently beta-testing technology that gives users real-time access to call detail data, a necessary capability for real-time monitoring.

US Sprint Communications Co. offers a monitoring service for its 800, UltraWATS, Virtual Private Network, SprintNet and voice mail customers free of charge, but it is not a daily, around-the-clock monitoring service, and the typical lag time until users are notified of problems is 24 hours.

In a filing on behalf of the Securities Industry Association, Visa USA, Inc., the New York Clearinghouse Association and Pacific Mutual, Levine urged the agency to require carriers to offer monitoring services. Network equipment could monitor traffic according to preset parameters for call volume, off-hour calling and suspicious area or country codes, he said. If an anomaly is detected, Levine's proposal suggests that carriers notify users within 30 minutes. Therefore, users would be held liable for only a nominal amount of fraudulent charges.

Now there's an expert system that turns network troubleshooting into sharpshooting.

Now, zero in on Ethernet or Token-Ring network problems, and hit the mark every time with HP's new network advisor. Just type in the symptoms, and let it go to work.

Its expert-system based Fault Finder software decides on the best action to take, automatically runs the tests you need, and tells you right where the problem is.

The network advisor also checks FCS errors, nodes, collisions, error frames and other network vital signs for baseline activity. A network and node statistics screen gives you a clear view of network performance. And if a problem's in sight, it decodes the major protocols to make sure you're on target.

So take better aim at network problem solving. Call **1-800-752-0900**, and ask for **Ext. 2163**. We'll send you a free demo disk that shows how the HP network advisor turns troubleshooting into sharpshooting.

There is a better way.

HEWLETT PACKARD

© 1991 Hewlett-Packard Co. TMCTD104/NW

IBM solidifies role of AS/400

continued from page 1

extra horsepower in part to support enhanced networking functions. "The new OS/400 provides additional support for the AS/400 as a server and for cooperative processing," Grabe said.

Among the OS/400 enhancements is support for IBM's Common Programming Interface for Communications (CPI-C). CPI-C is the API to LU 6.2, IBM's strategic communications protocol for all Systems Application Architecture (SAA) operating systems and the communications foundation for cooperative processing applications in SAA.

Support for CPI-C is intended to simplify the development of such applications by giving programmers a common API for all SAA operating systems.

OS/400 is the last of the four SAA operating systems — after MVS, VM and OS/2 Extended Edition — for which IBM has announced CPI-C. CPI-C will be included in OS/400 Version 2 Release 1, due out next month.

OS/400 Version 2 Release 1.1, scheduled for March 1992 delivery, will expand AS/400 users' ability to access data on other SAA machines by including features laid out in IBM's DRDA. DRDA is the blueprint IBM announced last year for how data should be distributed and shared among SAA relational data bases.

The OS/400 data base will have read and write access to remote SAA data bases. That means applications can be placed where they are most used in an enterprise net yet be accessed from anywhere in the network. SQL/400, the SQL implementation for the AS/400, is required for this function.

Nili Young, vice-president at the META Group, a consultancy in Westport, Conn., said support for DRDA is significant.

"It means now you're just coming up to true distributed computing," Young said. "The only way you're ever going to get off these huge mainframes is to have a distributed data base architecture."

Also in the data base arena, IBM announced a new version of its PC Support/400 software, which runs on DOS or OS/2 Extended Edition machines and provides access to AS/400 resources. The new PC Support/400 Version 2 adds a number of new APIs intended to make it easier for application developers to write cooperative processing applications.

PHOTO ©1991 WENDY BARROWS

Stephen Carter

Among them are APIs used to write applications that give personal computers access via SQL to a remote AS/400 data base, said Stephen Carter, manager of AS/400 distributed products for IBM's Application Systems Business unit. The remote SQL API is designed to give developers of DOS- or OS/2-based applications a way to access data on an AS/400 without having to emulate a 5250 terminal.

"It allows vendors that are primarily focused on building front ends for data bases to utilize the AS/400 as a back-end data base server," Carter said. "We're trying to provide a number of options for utilizing and leveraging the data base on the AS/400."

To make it easier for programmers to develop cooperative processing applications, IBM is shipping PC Support/400 Tools with PC Support/400 Version 2. It contains sample programs that show how the new APIs work.

IBM also announced that PC Support/400 can coexist with Novell NetWare 3.1 client software on a personal computer attached to an IBM Token-Ring local-area network. That means the same personal computer can access a NetWare server and an AS/400. IBM will use DOS extender technology from Rational Systems, Inc. to run PC Support/400 in extended memory, thus freeing up DOS memory.

In a statement of direction, IBM pledged to further enhance the interoperability of the AS/400 and NetWare LANs. Carter declined to elaborate on those plans, although he said that among the requirements is the need to let AS/400 and NetWare clients coexist on workstations attached to Ethernet LANs. Another requirement is to improve interoperability between the AS/400 and NetWare servers, such as with an LU 6.2 link that would make it easier for them to share data.

The META Group's Young said she expects IBM later this year will announce a statement of direction to provide software that would let the AS/400 function as a NetWare server.

IBM also announced that PC Support/400 will work with Microsoft Corp. Windows 3.0 on DOS workstations to give Windows users access to PC Support/400 functions.

IBM announced it will jointly market Rumba/400, a new product from Wall Data, Inc. that provides a Windows 3.0 interface to AS/400 applications. Used with Wall Data's existing Rumba product for 3270 applications, users could open separate windows into AS/400 and mainframe applications, said John Wall, chairman and executive vice-president of Wall Data.

OS/400 Version 2 ranges from $3,750 to $135,000. Free upgrades within the same processor group will be offered until Sept. 1, after which upgrades will range from $375 to $7,895.

PC Support/400 Version 2 will be available in May. Its price ranges from $995 to $22,140, which includes a maximum of 25 workstation licenses. Additional workstation licenses cost $50 each. Upgrades from existing PC Support/400 versions range in price from $100 to $1,500.

AS/400 ups OSI support

NEW YORK — Along with enhancements that beef up the Application System/400's role as a server, IBM last week unveiled products that give the minicomputer support for OSI file transfer and electronic mail.

IBM's new OSI Communications Subsystem/400 brings support for Open Systems Interconnection Layers 3 to 6 to the OS/400 operating system.

OSI applications written by users or third parties can run on top of the OSI subsystem to let the AS/400 interoperate with non-IBM or other IBM machines running similar OSI protocols.

IBM also announced the first two applications that will work with the AS/400 OSI subsystem: IBM OSI Message Services/400 Version 2, which is an OSI X.400-based E-mail application, and IBM OSI File Services/400 Version 2, an OSI File Transfer, Access and Management (FTAM) facility.

Similar versions of the OSI subsystem, X.400 and FTAM applications have been announced or are available on the other Systems Application Architecture operating systems: OS/2 Extended Edition, MVS and VM.

The OSI subsystem also supports the OSI Common Management Information Protocol (CMIP) and Common Mangement Information Services (CMIS).

That support will enable an AS/400 to act as a manager for an OSI network and ship OSI alert data to NetView, either using native CMIP/CMIS or the IBM generic alert format.

OSI Communications Subsystem/400 Version 2 Release 1 is scheduled to be available next month. Release 1.1, which adds support for X.400 and FTAM software, should be available in March 1992. The subsystem ranges in price from $1,200 to $19,930.

OSI File Services/400 Version 2 Release 1.1 is scheduled to ship in March 1992 and ranges in price from $1,150 to $19,080. OSI Message Services/400 Version 2 Release 1.1 should also be available in March 1992; it ranges in price from $570 to $9,380.

— Paul Desmond

RBHCs revise ISDN rollout

continued from page 1

technical references intended to help resolve some of the incompatibility problems that have plagued ISDN by specifying a common set of ISDN standards to which vendors can build.

At a press event in March, users, vendors and RBHCs voiced commitment to ISDN-1, saying widespread support for the specifications would accelerate deployment of ISDN, spur equipment development and boost use of the technology.

In addition, AT&T Network Systems Group, Northern Telecom, Inc. and Siemens Stromberg-Carlson announced that switch software supporting ISDN-1 would be ready for testing by phone companies in December and generally available in 1992.

"National ISDN-1 is a major reason why the RBHCs are now willing to deliver what they've been talking about for the past five years," said Ian Angus, president of Angus TeleManagement Group, Inc., a Pickering, Ontario, consultancy specializing in ISDN. "The RBHCs are beginning to realize that if they want to see ISDN accepted by users on a large scale, they have to take the initiative and deploy it."

The new deployment plans reflect this realization, he said.

- Ameritech's lines with access to ISDN will increase from 2.2 million of 13.7 million total lines by year end to 12.2 million of 14.6 million total lines by year-end 1994.
- Bell Atlantic Corp. said 293 of its switches will be equipped to support ISDN by year end. Its ISDN-ready lines will increase from 6.9 million this year to 17.1 million, or 90% of total access lines, by year-end 1994.
- BellSouth Corp. said 121 of its switches will be equipped to support ISDN by year end. Roughly 3.1 million lines have access to ISDN now. That number will rise to 10.5 million, or 52% of all access lines, by year-end 1994.
- Nynex Corp. said it will have 29 switches equipped to support ISDN by year end. The number of lines with access to ISDN will rise from 2.1 million in 1991 to 4.4 million, or 27% of all access lines, by year-end 1993.
- Pacific Bell's lines with access to ISDN will increase from 3.7 million, or 3.7% of all access lines, to between 6 million and 7.5 million, or 40% to 50% of all

(continued on page 65)

Network World Advertising Sales Offices

BOSTON
Donna Pomponi, District Manager
Eleni Brisbois, Sales Assistant
161 Worcester Road, Framingham, MA 01701
(508) 875-6400/FAX: (508) 651-1853

NEW YORK
Paul Bonington, District Manager
Marlene Levis, Sales Assistant
365 W. Passaic St., Rochelle Park, N.J. 07662
(201) 587-0090/FAX: (201) 712-9786

NEW JERSEY/PHILADELPHIA/D.C.
Joan Daly, Eastern Regional Manager
Marlene Levis, Sales Assistant
3365 W. Passaic St., Rochelle Park, N.J. 07662
(201) 587-0090/FAX: (201) 712-9786

CHICAGO
Don F. Mahlmeister, National Sales Manager
Dan Gentile, District Manager
Kathy Mazzie, Sales Assistant
10400 West Higgins Rd., Suite 300
Rosemont, Ill. 60018
(708) 297-8855/FAX: (708) 827-9159

SAN FRANCISCO
Chris Curry, Western Regional Manager
Sandra Kupiec, District Manager
Lonnie Forbes, Sales Assistant
Beverly Davis, Sales Assistant
2083 Landings Drive, Mountain View, Calif. 94043
(415) 691-0510/FAX: (415) 691-0525

ATLANTA
Don Seay, District Manager
Annette Johnson, Sales Assistant
1400 Lake Hearn Dr., Suite 330, Atlanta, Ga 30319
(404) 394-7509/FAX: (404) 255-5123

LOS ANGELES
Dana McCarron, District Manager
Karen Silverstein, Sales Assistant
18008 Sky Park Cir., Suite 145, Irvine, Calif. 92714
(714) 250-3006/FAX: (714) 250-4881

RESPONSE CARD DECKS
ACTION CENTER
PRODUCT CLASSIFIED ADVERTISING
RESOURCE DIRECTORY
Joan Bayon Pinsky, Sales Dir./Product Classified
Clare O'Brien, Account Executive Mountain and Pacific Time Zones
Eleni Brisbois, Sales Assistant
161 Worcester Road, Framingham, Mass. 01701
(508) 875-6400

RECRUITMENT ADVERTISING
William Reinstein, National Sales Director
Pam Valentinas, District Manager
Catherine Keefe, National Sales Assistant
(508) 875-6400

ADVERTISING OPERATIONS
Karen Wallace - National Account Supervisor
Linda Miller - W. Region Account Coor.
Barbara Hill - Classified Account Supervisor
(508) 875-6400

Network World, Inc.

An IDG Company
Network World Headquarters:
161 Worcester Road, Framingham, Mass. 01701
Phone: (508) 875-6400/FAX: (508) 879-3167

Gary Beach - President
Mary Fanning - Dir. of Financial Operations
Nanci Farquharson - Adm. Assistant
(508) 875-6400

MARKETING
Evilee Thibeault - Director of Marketing
Carol A. Leonard - Marketing Comm. Specialist
(508) 875-6400

RESEARCH
Ann MacKay - Research Manager
(508) 875-6400

CIRCULATION
Richard Priante - Director of Circulation
Renee Visconti - Fulfillment Manager
Jim Pernock - Customer Service Rep.
(508) 875-6400

PRODUCTION
Ann Finn - Production Director
Cheryl Rothman - Production Coordinator
Anne Rosenkranz - Imaging Manager
Patricia O'Rourke - Quality Assurance Coor.
(508) 875-6400

REPRINTS
Donna Kirkey - Reprint Coor./Graphic Designer
(508) 875-6400

LIST RENTAL SERVICES
Kevin Normandeau - List Rental Sales
P.O. Box 9151, Framingham, MA 01701-9151
(508) 879-0700

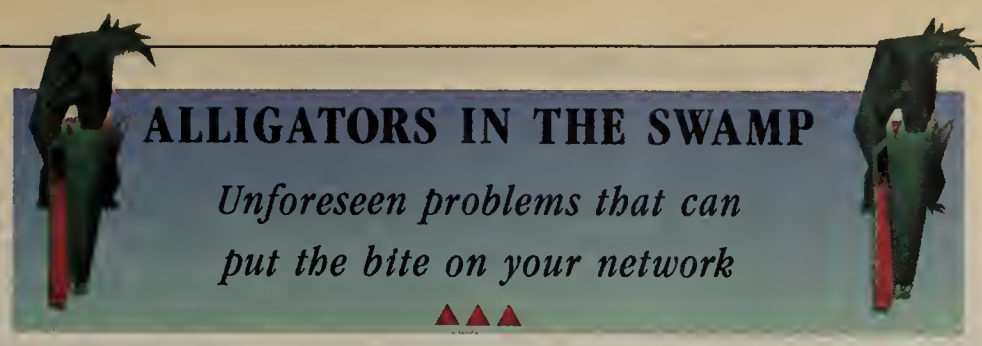
INFORMATION SERVICES
Jeff Pennett - Director of Info. Services
Jack McDonough - Mgr. of Info. Services
(508) 875-6400

DISTRIBUTION
Bob Wescott - Distribution Manager
(508) 879-0700

IDG

Patrick J. McGovern - Board Chairman
Axel Leblois - Vice Chairman
Walter Boyd - President
William R. Murphy - Vice-President Finance

Network World is a publication of IDG, the world's largest publisher of computer-related information. IDG publishes over 130 computer publications in more than 40 countries. Nineteen million people read one or more IDG publications each month. IDG contributes to the IDG News Service offering the latest on domestic and international computer news.



Attack of the autodialing computer

Computer-generated calls wreak havoc on Emory University's phone system.

Imagine you are responsible for telecommunications at a university with more than 10,000 phone lines. Now imagine that a telemarketing firm has programmed its autodialing computer to call every one of those 10,000 lines, many of which are located in hospital rooms.

In December 1990, that scenario unfortunately was a reality at Emory University in Atlanta. To convey the magnitude of the problem, let me describe Emory's rather complex telephone system.

In August 1985, Emory migrated its telephone service from Centrex to a Northern Telecom, Inc. SL-100 private branch exchange with 5,500 phone lines. Due to phenomenal growth, we were up to 10,000 lines by August 1990. During the last fiscal year, the switch processed more than 53 million calls.

Currently, the switch is equipped with 200 direct-inward dial trunks, 208 direct-outward dial trunks, 96 outbound toll trunks and 24 inbound toll trunks. In addition, we have 88 tie-line trunks that connect us to an Atlanta medical network, which serves three other hospitals and a clinic. Two remote modules of the switch — one serving our two-year college and the other our North campus — are also connected to the SL-100.

To facilitate service and allow for future growth, Emory purchased two NXXs (equivalent to 20,000 phone numbers). One NXX is used for residential service, which includes student housing as well as a 100-room hotel. The other serves Emory's administration and faculty, as well as the hospital and medical center. Because our phone network supports a hospital, our operator services work 24 hours a day, 365 days a year.

One morning last December, Emory's director of libraries called me to report that his department was being plagued by computer-generated calls. I told him that without knowing where the calls were coming from, I was helpless. He mentioned that the message had presented a 900 number for interested parties to call back. If he received another call, he said he would make note of the number and call me back.

During the next few hours, I received several more calls from various departments within the university concerning the same problem. Apparently, a telemarketing firm had selected one of our NXXs and was methodically working its way through it. Slowly but surely, each telephone line on Emory's network was going to receive a call that would disrupt work and reduce productivity.

I made some quick calculations to determine the potential scope of this problem. Certainly, the autodialing computer could generate at least one call per minute for a total of 60 calls per hour. If the computer were programmed to call eight hours per day, it would generate 480 calls each day. If the calls were made only Monday through Friday, it would take the computer 20 days to get through our customer base. We could be hounded by this problem for the next month!

The next call I received was from a doctor at the hospital on our network. Evidently, the telemarketing computer was now attacking the hospital staff and patients. Even patients in the intensive care units were receiving the computer-generated calls.

Then I finally received one of these calls myself. After restraining my desire to throw the telephone through the window, I listened intently to the message.

I was given a 900 number, which I wrote down, to call in order to claim my prize. The message also gave a long-distance number to call to listen to the message again. I wrote that number down also. When the message ended, I tried calling the long-distance number; all I got was an answering machine that repeated the message and no further details. I thought the answering machine might be located in a business, so I tried calling the same number with a different last digit. It proved to be a dead end also.

As a last resort, I called the 900 number from an unrestricted line, hoping for an additional clue, but I struck out again.

Then I remembered that the Federal Communications Commission had allocated certain NXXs within the 900 area code to specific long-distance carriers. So I called AT&T to see if they had the NXX in question. They didn't but told me who did — MCI Communications Corp., which is also Emory's long-distance vendor.

I called MCI and explained the situation. The woman with whom I spoke called back a short time later to tell me their data base showed that 900 number had been taken out of service.

I told her it was working and they might be missing revenue on it. She said she would have the last owner of the 900 number call me, which he promptly did. After discussing the specifics, we determined that the number no longer belonged to his company.

Tuesday afternoon, MCI called again to say they had located the current owner of the 900 number and a representative of that company would be calling me soon. On Wednesday morning, the owner called and I explained the situation. He said he would take immediate steps to reprogram the computer to stop calling Emory's phones.

About 15 minutes later, I received a call from a woman who worked for the telemarketing company. She told me she had removed our numbers from their computer and gave me her number to call back in case we had any further problems. It had taken three days, but I had stopped the onslaught of calls.

In a way, I had also helped the telemarketing company. As do most businesses, Emory blocks calls to 900 numbers. The telemarketing company was obviously making its money by enticing people into calling the 900 number. No one at Emory would have been able to call that number from work. The only people who would have called them back would be those who had bothered to write down the number and taken it home with them to make this $10 call — not very many, I would venture to guess.

About a week later, I was watching the local news. The consumer advocate reporter was talking about a service that lets consumers remove their names from "junk" calling lists, the telephonic equivalent of junk mailing lists.

Without delay, I called the provider of the service, the New York-based Direct Marketing Association (DMA) to see if they could help us. I was told they could remove numbers from lists used by human callers but they didn't extend this service to computer-generated calls. I found this policy decision bewildering. Unless the computers are programming themselves, there must be a live person somewhere programming them to make the calls.

Several months ago, the Georgia Public Service Commission passed legislation restricting computer-generated calls to certain hours of the day. It would seem highly prudent for the DMA or some other group to begin offering to exempt business lines from receiving these types of calls. Perhaps if enough organizations that have been plagued by this problem write to the DMA, the group will reconsider its decision. Its address is: Direct Marketing Association, 11 W. 42nd St., New York, N.Y. 10036.

Recently, the FCC has shown its willingness to begin policing new telecommunications services. If computerized callers continue to refrain from policing themselves, they may find themselves yet further restricted — and perhaps out of business.

Peck is a telecommunications analyst with Emory University in Atlanta.

IT'S HARD TO DRAIN THE SWAMP when those reptiles keep getting in the way. To share your "alligator story," call Susan Collins, associate features editor, at (508) 820-7413 or fax your idea to (508) 820-3467.

By MARVIN PECK

Infotron, Gandalf merge

continued from page 2

hubs and Integrated Services Digital Network markets in recent months.

The two companies hope to align their products under a common net management scheme.

"The merger makes some sense," said Todd Dagres, director of data communications research and consulting at The Yankee Group, a market research firm in Boston. "Gandalf has come at the market from the low end and LAN realm, whereas Infotron has tried to provide the middle layer and up with T-1 and T-3 muxes. The success of the merger will be determined by how smoothly the integration of their products goes."

Users also expressed optimism. "We like Infotron's products, but they've slowed down on new product development and can use help in the LAN area," said Jim Broman, manager of telecommunications planning for Target Stores, Inc. in Minneapolis.

According to James Castle, chairman, president and chief executive officer of Infotron, "The merger is particularly consistent with the high growth in the internetworking market, where we both play."

Jim Newell, Gandalf's chief financial officer, said that operating in both the wide-area and LAN markets requires research and development investments that are too big for Gandalf or Infotron to handle alone.

According to industry observers, the merger may give Infotron the resources needed to bolster its position in markets in which it has trailed rivals.

"Infotron was one of the first players in the mux market to make available a T-3 product [via its 1989 Licom, Inc. acquisition]," Dagres said. "But they never did much with it and didn't aggressively pursue other markets, such as frame relay and [Switched Multimegabit Digital Services]."

Infotron may address some of those issues next month when it reveals details of a new product architecture that observers said will include a line of high-end multiplexers.

The merger should also position Infotron better against rivals such as Timeplex, Inc. that have branched out into the LAN interconnection market, said Curtis Price, a research analyst at International Data Corp., a Framingham, Mass., market research firm.

The combined international strength of Gandalf and Infotron should also prove valuable in that the international market is poised for faster growth than many segments of the domestic market, Price said.

Infotron has a presence in 64 countries and holds an estimated 5% share of the $620 million worldwide T-1 multiplexer market, while Gandalf conducts business in more than 40 nations.

The proposed merger, which is subject to a definitive merger agreement and approval by both companies' shareholders, probably will not be completed until at least July, according to Infotron officials.

INFOTRON Systems Corp.

Based: Cherry Hill, N.J.

1990 financials:
Revenue: $84.5 million
Net loss: $33.3 million

Primary products: StreamLine T-1 and T-3 multiplexers, packet switches and network management systems

gandalf Technologies, Inc.

Based: Ottawa

1990 financials (in Canadian dollars):
Revenue: $161.6 million
Net loss: $10.6 million

Primary products: 10BaseT Access Hub line of LAN wiring hubs, ISDN TA-1 terminal adapters, modems and Starmaster data switches

PANEL OF EXPERTS

MultiMux™ Statistical Multiplexers

Expect substantial savings in your data communication costs when you replace your dial-up lines with a pair of MultiMux statistical multiplexers and one or two leased lines. You'll simplify your asynch communications while adding new levels of network security.

And save on equipment cost, too. Take advantage of MultiMux flexibility in linking remote user groups to LANs, without establishing expensive separate LAN systems for each distant location.

All the features and support you require. Multi-Tech's statistical multiplexers are available in 4 to 32 channel models with 9600 or 14,400 bps internal modems. Simple to install and easy to use. Plus, every MultiMux has a built-in command modem which links your MultiMux to Multi-Tech's Support Center where remote diagnostics can be performed should problems occur. And there's a toll-free helpline to get assistance whenever you need it.

Multi-Tech Systems. For twenty years, your expert data communications resource for modems, multiplexers, LAN systems and 3270 emulators.

MultiTech® Systems

The right answer every time

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112 U.S.A.
(612) 785-3500 (800) 328-9717
U.S. FAX (612) 785-9874
International Telex 4998372 MLTTC
International FAX (612) 331-3180

Oracle unveils data base for NetWare 386

continued from page 2

Version 6.0; Oracle PL/SQL, a procedural language extension to SQL; SQL DBA, an on-line data base administration tool; and SQL Net SPX, the interface with NetWare 386 that manages incoming requests from clients and other Oracle servers.

Because Oracle supports more than 80 hardware platforms for its data base software, a key benefit of the new product will be the fact that it can be integrated with other Oracle data bases.

"We can provide a solution for a distributed data base that users can access across multiple NetWare servers and all the other platforms we support," said Jim Reilly, senior director of marketing at Oracle. He added that he views NetWare's extensive support of various architectures and net standards as a means for Oracle to extend its multivendor connectivity strategy.

At the announcement, Compaq Computer Corp. was on hand to offer test results of Oracle Server's performance on NetWare 386. Ron Ward, Compaq's director of product development, said Oracle Server for NetWare 386 could process 41.1 transactions per second, twice as fast as a comparable OS/2 system.

"When we saw the results, they even exceeded our expectations," said Darrell Miller, executive vice-president at Novell. Oracle and Novell had been working together on this project for two years.

The high performance of Oracle Server for NetWare 386 is due in part to the fact that NetWare 386 is a nonpreemptive operating system, meaning it does not prioritize and schedule CPU time for applications — tasks that add processing overhead. In other words, NetWare 386 lets Oracle perform data base tasks without interruption, thereby increasing transaction throughput. Oracle also uses a large amount of random-access memory for caching, which reduces disk I/O requests and allows more users to access the data.

Microsoft maintains that there are trade-offs to nonpreemptive operating systems, such as the fair division of CPU time, potential for applications causing system crashes and application development issues, said Craig Burton, chief executive officer of the Clarke Burton Group, a Salt Lake City consultancy.

Barry Gelber, director of social sciences computing at the University of California, Los Angeles, who worked with a beta release of Oracle Server for NetWare 386, was impressed with its ease of use. Because his users are not programmers, Gelber is excited about third-party front-end tools that are available for Oracle that simplify access to data. Jerry Baker, senior vice-president at Oracle, said that during the next 12 months, his company will be adding significantly to its end-user tools.

Oracle Server for NetWare 386 runs on personal computers using Novell NetWare 3.11 or later and configured with 9M bytes of RAM and at least 30M bytes of disk storage for the Oracle Server program. Network hardware and software supporting Novell's Sequenced Packet Exchange (SPX) protocol is also required.

Pricing is based on the number of users, with an initial system priced at $3,699 for a maximum of eight users. Oracle Server for NetWare 386 is shipping now.

RBHCs revise plans for ISDN rollout

continued from page 62

access lines, by year-end 1994.

■ Southwestern Bell Corp. plans to have 51 of its 1,358 switches equipped to support ISDN by year end. The number of lines with access to ISDN is expected to increase from 1.1 million in 1991 to 4.4 million, or 32% of all major metropolitan-area access lines, by year-end 1994.

■ US West Communications, Inc. said it plans to have 130 switches in its 13-state region equipped to support ISDN this year. The number of lines with access to ISDN will rise from 3 million this year to 7.3 million, or 51% of all access lines, in 1994.

NETWORK WORLD

161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Non-qualified subscribers: $5.00 a copy; U.S. — $95 a year; Canada, Central & South America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label appearing on front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. and Canada only to qualified management or professionals who specify and maintain communications equipment and systems, including voice, data and video, as well as to common carriers, consultants, systems houses and manufacturers of communications equipment.

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus 50 cents per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, 161 Worcester Road, Framingham, Mass. 01701-9172.

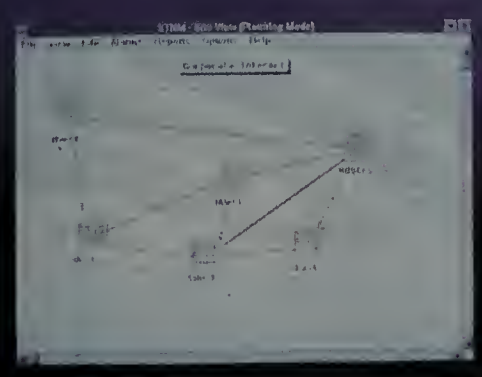
Copyright 1991 by Network World, Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.

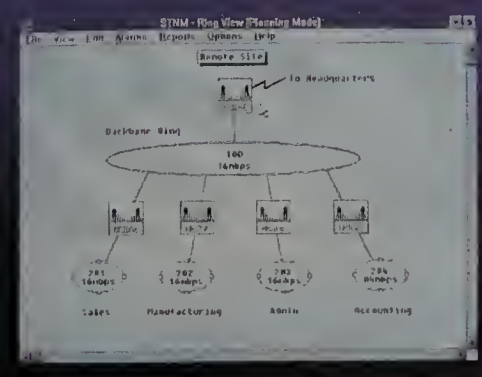
The Audit Bureau

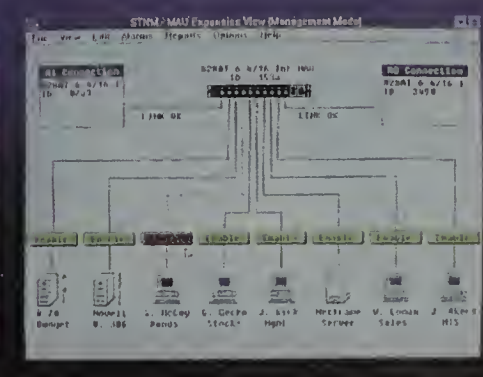
Reprints (minimum 500 copies) and permission to reprint may be purchased from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

16 MB/S TOKEN RING

WITH NO COMPROMISES







Active MAU Technology Supports Extended Distances Over UTP Cable. Star-Tek 828AT Intelligent MAUs offer you uncompromising performance and an unprecedented degree of flexibility in choosing the media and technology that's right for your network. Twisted pair options include sophisticated active MAU technology for superior performance over UTP as well as support for standard STP cable. Optical fiber support lets you extend either main ring links or lobes campus wide.

Star-Tek Intelligent MAUs provide a safety net for your vital token ring operations. Fault tolerance technology pioneered by Star-Tek automatically detects and isolates main ring failures, preventing network crashes. This level of protection greatly increases physical network reliability.

Real Time Network Management Under Windows 3.0, OS/2 and NetView. Star-Tek Network Management is optimized for token ring environments, providing both in-band and out-of-band error monitoring and control. Real time status is displayed via an extensive hierarchy of detailed network maps. Alarms report error threshold crossings, cable failures or equipment breakdowns, allowing you to diagnose problems quickly and correct them from your desk.

Choose from Windows 3.0, OS/2 or NetView for your management environment. Monitor and control large sites without digging through wiring closets. Managing remote sites is just as easy, allowing you to provide the same rapid response anywhere in your network.

Over 50,000 Users Already Run Their Vital Token Rings With Our Assistance. As a pioneer in physical layer management and multi-media support, Star-Tek has the experience to help you build a solution for your strategic token ring applications. For complete information and a demo disk, call (800) 225-8528 or (508) 393-9393.

STAR TEK

100 Otis Street Northboro, MA 01532

1990 Star Tek Inc. All brand names and product names are trademarks or registered trademarks of their respective holders

© 1991 AT&T

With another 800 service, you lose more calls.

Ever wonder what you could have sold?

There are lots of things you get more of with AT&T 800 Service. The most important one could be sales.

With AT&T you can get more sales because AT&T gets more calls through than any other 800 service. AT&T connects calls 25% faster, so customers are less likely to hang up waiting for their calls to go through. And AT&T also blocks fewer calls, which means more customers get through the first time.* These extra calls can translate into thousands of dollars in sales every year.

That, along with our competitive prices,

*Based on basic 800 service comparisons.

brings up an important question. Can you afford not to have AT&T 800 Service?

Better service, better results. Another AT&T advantage.

And now AT&T 800 Service is more affordable than ever. Call through June 30, 1991 and we'll waive the installation charges on any domestic AT&T 800 Service.

For details, contact your AT&T Account Executive or call 1 800 222-0400.

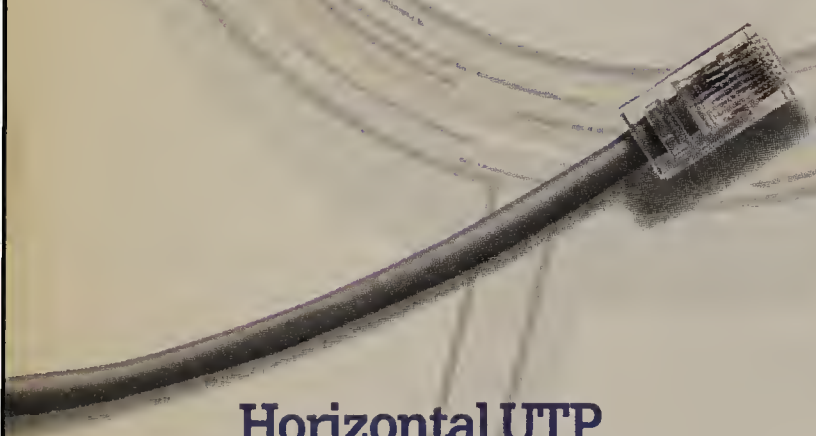
AT&T

The right choice.

Get Smart Now!
Your IBM 8228 is Worth $200 When You Buy Proteon's Series 70. Limited time offer.

How To Keep Your Token Ring Cabling Decision From Coming Down To The Wire.

Fiber Backbones



Horizontal UTP

IBM-type STP

Combine Fiber Backbones With UTP Or STP To The Desktop Using The Industry's Smartest Token Ring Hub.

The Multi-media Series 70 Intelligent Wire Center

Now you can mix and match networking's most popular wiring options with the multi-media Series 70™ Intelligent Wire Center. Only the Series 70 supports 4 and 16 Mbps token ring networks over fiber and shielded and unshielded twisted pair.

The IBM-compatible Series 70 helps network managers meet their specific cabling requirements as well as plan their long term strategy. High-performance fiber can link floors, departments or buildings campus-wide. Cost-effective UTP can be used horizontally within departments, making adds, moves and changes a snap. And traditional STP is ideal for IBM compatibility. Regardless of your requirements, the Series 70 makes it easy to build a structured cabling system.

The Series 70 also makes it easy to keep your network up and running. It features LED indicators that provide network status at-a-glance. And working with TokenVIEW Plus,™ Proteon's network management software, the Series 70 is so smart it can remotely pinpoint and fix problems, even if the network goes down.

No competitive solution makes installing and maintaining a token ring network easier. None provides greater network availability.

The flexible, very smart Series 70. If you want your choice of token ring cabling, it's the only choice you need to make. For complete information on our Series 70 and other 4/16 Mbps token ring systems, call TOLL FREE, or write, Proteon Inc., Two Technology Drive, Westborough, MA 01581.

proteon

The Best Value In Token Ring.

1-800-545-RING

In MA, call 1-508-898-2800

Available in USA and in Canada from:

Costa Distributing, Gates/FA Distributing, INGRAM MICRO D, Reliable Networking Inc., Robec Distributors, Tech Data Corporation, VITEK, Merisel Computer Products, and Tech Data – Canada.

Proteon and the Proteon logo are registered trademarks, and TokenVIEW Plus and Series 70 are trademarks of Proteon Inc.
IBM is a registered trademark of International Business Machines Corp.

Copyright © 1990 Proteon Inc.